11-6625-821-45

TM 11-6625-821-45

TECHNICAL MANUAL

GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS

TEST SET, DIRECTION FINDER SET AN/ARM-93

This copy is a reprint which includes current pages from Changes 1 and 2. The title was changed by C 2 to read as shown above. App A was superseded by TM 11-6625-821-40P, 30 Mar 73.

HEADQUARTERS, DEPARTMENT OF THE ARMY
SEPTEMBER 1966

D 101.11:

READEX FICHE best copy available

CAUTION

Inverter, Power, Static CV-2128/ARN-82 contains transistorized circuits. See paragraph 2-3 before making resistance measurements on these circuits.

TECHNICAL MANUAL
No. 11-6625-821-45

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *22 September 1966*

GS and Depot Maintenance Manual

TEST SET, DIRECTION FINDER SET AN/ARM 93

Paragraph Page

CHAPTER 1. FUNCTIONING

Section I. General functioning of Test Set, Direct Finder Set AN/ARM-93

Scope 1-1 1-1
Functional block diagram analysis 1-2 1-1

II. Detailed function of Test Set, Direction Finder Set AN/ARM-93

General 1-3 1-2
Detailed functioning of receiver section 1-4 1-3
Detailed functioning of control section 1-5 1-5
Detailed functioning of loop test fixture 1-6 1-9

III. Interunit circuit functioning

General 1-7 1-9
Function and frequency range selection 1-8 1-10
Tuning control 1-9 1-10
Manual LOOP control circuit 1-10 1-10
Manual audio gain control circuit 1-11 1-11
Manual rf gain control circuit 1-12 1-11
Bfo switching and tuning meter circuits 1-13 1-12

CHAPTER 2. TROUBLESHOOTING

Section I. General troubleshooting techniques

General 2-1 2-1
Organization of troubleshooting procedures 2-2 2-1
Test equipment required 2-3 2-1

II. Troubleshooting procedures

Test setup 2-4 2-2
Troubleshooting chart 2-5 2-3
Voltage measurement for inverter 2-6 2-5
Troubleshooting loop antenna simulator circuit 2-7 2-5

CHAPTER 3. REPAIRS AND ALIGNMENT

Section I. Repairs

Parts replacement techniques 3-1 3-1
Removal and disassembly techniques 3-2 3-1
Removal and disassembly of inverter 3-3 3-2
Removal and disassembly of control unit 3-4 3-2
Removal and disassembly of LOOP INDICATOR 3-5 3-2
Removal and disassembly of BEARING INDICATOR 3-6 3-3
Removal of test set front panel 3-7 3-3
Replacement of inverter 3-8 3-3
Reassembly and replacement of control unit 3-9 3-3
Reassembly and replacement of LOOP SIMULATOR 3-10 3-4
Reassembly and replacement of BEARING INDICATOR 3-11 3-5
Replacement of test set front panel 3-12 3-5

---

*This manual supersedes TM 11-6625-821-45, 1 February 1966.

Section II. Alignment

	Paragraph	Page
Test equipment and additional equipment required for alignment	3-13	3-7
Inverter load adjust	3-14	3-8
Alignment of LOOP SIMULATOR	3-15	3-8
LOOP SIMULATOR impedance adjustment	3-16	3-9
Adjustment of BEARING INDICATOR	3-17	3-10
Adjustment of inverter	3-18	3-10
Adjustment of control unit	3-19	3-10

CHAPTER 4. GENERAL SUPPORT TESTING PROCEDURES AND DEPOT OVERHAUL STANDARDS

	Paragraph	Page
General	4-1	4-1
Test equipment, tools, and materials required	4-2	4-1
Test facilities	4-3	4-2
Fabricated equipment	4-4	4-2
Modification work orders	4-5	4-2
Inverter, Power, Static CV-2128/ARN-83 physical tests and inspection	4-6	4-4
Inverter test	4-7	4-7
Control, Direction Finder C-6899/ARN-83 physical tests and inspection	4-8	4-7
Control unit test	4-9	4-11
Text Fixture, Loop Antenna MT-3667/ARM-93 physical tests and inspection	4-10	4-13
Loop test fixture test	4-11	4-15
Simulator, Antenna SM-446/ARM-93 physical tests and inspection	4-12	4-17
Sense antenna adapter test	4-13	4-19
Test Set, Radio TS-2502/ARM-93 physical tests and inspection	4-14	4-21
Test set receiver circuitry test	4-15	4-23
LOOP SIMULATOR resolver test	4-16	4-25
LOOP SIMULATOR impedance test	4-17	4-27
LOOP SIMULATOR output test	4-18	4-29
Summary of test data for general support testing procedure and depot overhaul standards	4-19	4-30
CHAPTER 5. ILLUSTRATIONS		5-1
INDEX		I-1

CHAPTER 1

FUNCTIONING

Section I. General Functioning of Test Set, Direction Finder Set AN/ARM-93

1-1. Scope

a. General. This manual contains general support and depot maintenance instructions for Test Set, Direction Finder Set AN/ARM-93. It includes instructions appropriate to these categories of maintenance for troubleshooting, testing, aligning, and repairing the equipment. The manual also lists tools, materials, and test equipment for maintenance. Detailed functions of the equipment are also covered.

b. Report of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-ME-NMP-AD, Fort Monmouth, N. J., 07703.

Note. For other applicable forms and records, see paragraph 1-3, TM 11-6625-821-12.

c. Indexes of Publications. Refer to the latest issues of DA Pam 310-4 and DA Pam 310-7 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-2. Functional Block Diagram Analysis
(fig. 5-2)

a. General. Test Set, Direction Finder Set AN/ARM-93 checks the performance of Radio Receiver R-1391/ARN-83; Control, Direction Finder C-6899/ARN-83 (control unit); and Inverter, Power, Static CV-2128/ARN-83 *b* through *d* below provide a block diagram description of each performance check, *e* provides a block diagram description of Test Fixture, Loop Antenna MT-3667/ARM-93).

b. Receiver. The test set checks the performance of the receiver by simulating the signals applied to the receiver during normal operation and by providing an indication of the receiver's response to such signals. The loop antenna signal and sense antenna signal for the receiver are produced with an external signal generator, a loop simulator, a cable simulator, and Simulator, Antenna SM-446/ARM-93 (sense antenna adapter). The external signal generator provides the radiofrequency (RF) carrier for the two signals. The RF carrier is applied directly to SENSE ANTENNA connector J10. The sense antenna signal from J10 is connected to the receiver through the sense antenna adapter, which provides an impedance match between the test set and the receiver. The RF carrier is also applied to the loop simulator through a converter. The loop simulator adds directional characteristics to the RF carrier and simulates Antenna AS-1863/ARN-83 (fixed loop antenna) normally used with the receiver. The converter enables the operator to read the field strength of the RF carrier at the simulated fixed loop antenna directly from the external signal generator output meter. The field strength to read in microvolts per meter when the signal generator output meter measures the signal generator output in microvolts. From the loop simulator, the RF carrier is applied to the cable simulator, which simulates part of the impedance of the loop cable located in the aircraft installation. The remaining impedance is simulated in Cable Assembly, Special Purpose, Electrical CX-11570/ARM-93, which connects the test set LOOP ANTENNA connector J9 to the receiver.

(1) The control information and power from the control unit in the test is applied to the receiver through RECEIVER-CONTROL switch S4.

(2) An external power source supplies 27.5-volt direct current (dc) to the test set. DC indicator lamp DS1 lights when the dc voltage is present. The 27.5 volts dc is applied to the inverter, which converts the dc voltage into 26 volts, 400 cycles per second (cps). The inverter applies its output to the control unit, which routes the 26 volts, 400 cps to the receiver through switch S4. Ac indicator control Q1 receives the 26 volts, 400 cps from the control unit and lights AC indicator lamp DS2.

(3) Switch S4D connects the output signal of the receiver to the BEARING INDICATOR on the test set. This indicator indicates the receiver's response to the simulated signals from the test set.

c. Control Unit. The test set checks the performance of the control unit by providing resistance checks and indicating the position of the tuning synchro. Switch S4B applies ground to one-half of the circuitry in the control unit. The other half of the circuitry is connected through the RECEIVER-CONTROL switch to CONTROL TEST switch S3. The CONTROL TEST switch selects each of the control unit circuits and connects them, one at a time, to the CONTROL TEST terminals. An external multimeter is connected to the CONTROL TEST terminals to measure the resistance of the selected control unit circuit.

(1) To check the performance of the tunning synchro in the control unit, switch S4D connects the synchro to the BEARING INDICATOR. The position of the tunning synchro can then be read directly from the BEARING INDICATOR.

(2) When checking the control unit, the inverter supplies the required alternating current (ac) power. Since the control unit is checked without a receiver, switch S4B switches in the inverter load to replace the load the receiver normally places on the inverter.

d. Inverter. When checking the performance of the inverter, the test set supplies the same dc voltage and load that is applied during normal operation of the inverter. The performance of the inverter is then checked with the external test equipment.

e. Loop Test Fixture. The loop test fixture is used as an aid to measure the Q of the two pairs of coils in the fixed loop antenna. When in use, the loop test fixture is installed between the fixed loop antenna and a Q-meter. Each pair of coils in the fixed loop antenna is applied to the input of the loop test fixture. The loop test fixture selects one of the pairs of coils and connects it to the Q-meter.

Section II. Detailed Function of Test Set, Direction Finder Set AN/ARM-93

1-3. General

The functional portion of the test set is divided into a receiver section and a control unit section. The receiver section is used to check the receiver, and the control unit section is used to check the control unit. RECEIVER-CONTROL switch S4 selects the section of the test.

set that is to be used. Detailed functioning of both sections is described in paragraph 1-4 and 1-5.

1-4. Detailed Functioning of Receiver Section

a. General. The receiver section of the test set consists of Test Set, Radio TS-2502/ARM-93, the control unit, the inverter, and the cables. The TS-2502/ARM-93 applies simulated antenna signals to the receiver and provides an indication of the receiver's response to such signals. It also provides interconnection between the control unit and the receiver and between the inverter and the receiver. The control unit provides all the control information required by the receiver, and the inverter provides the ac power required by the receiver. The cables interconnect the receiver, the test set, and external test equipment. Subparagraphs *b* through *d* below describe the detailed functioning of the circuits contained in the three units. and *e* describes the cables.

b. Test Set, Radio TS-2502/ARM-93.

(1) *Loop antenna simulator circuit.* The loop antenna simulator circuit provides the receiver with a signal that is normally provided by the fixed loop antenna in an aircraft installation.

(*a*) *Resolver B1* (fig. 5-3). The heart of the loop antenna simulator circuit is resolver B1. The two stator windings in resolver B1 simulate the two pairs of coils mounted at right angles to each other in the fixed loop antenna. The rotor winding induces an rf signal into each of the two stator windings. The phase and amplitude of the two induced stator voltages depend on the coupling between the rotor and each stator winding. This coupling can be varied by rotating the rotor winding with the LOOP SIMULATOR control. Therefore, any combination of phase and amplitude of induced voltage can be obtained from resolver B1 stator windings. Since the receiver, in normal use, utilizes phase and amplitude combinations of received rf signals to determine its bearing, the test set can simulate rf signals of any bearing.

(*b*) *Converter* (fig. 5-3). An external signal generator connected to SIGNAL GENERATOR connector J8 provides the rf signal for the loop antenna simulator circuit. From connector J8, the rf signal is applied to the rotor of resolver B1 through a converter circuit comprised of resistors R1 through R5 and capacitor C1. Resistor R1 fixes the input impedance at J8 to 50 ohms to match the output impedance of the external signal generator. Resistors R2 through R5 and capacitor C1 form a network that converts the indication on the signal generator output meter from microvolts to microvolts per meter. The microvolts per meter is the field strength of the signal at the simulated loop antenna in resolver B1.

(*c*) *Cable simulator* (fig. 5-3). The simulated loop antenna signal from the stator windings of resolver B1 is applied to LOOP ANTENNA connector J9 through a cable simulator. In normal operation of the receiver, a specific amount of impedance is required between the fixed loop antenna and the receiver. Capacitors C2 through C5 and inductors L1 through L10 simulate a part of this impedance. The remaining impedance is simulated in the 5-foot cable (Cable Assembly, Special Purpose, Electrical CX-11570/ARM-93) that connects LOOP ANTENNA connector J9 to the receiver. Variable inductors L3 and L8 are connected across the resolver stator windings so the impedance at the end of the 5-foot cable can be adjusted to the correct value.

(2) *Sense antenna simulator circuit.* The sense antenna circuit provides the receiver with a sense antenna signal

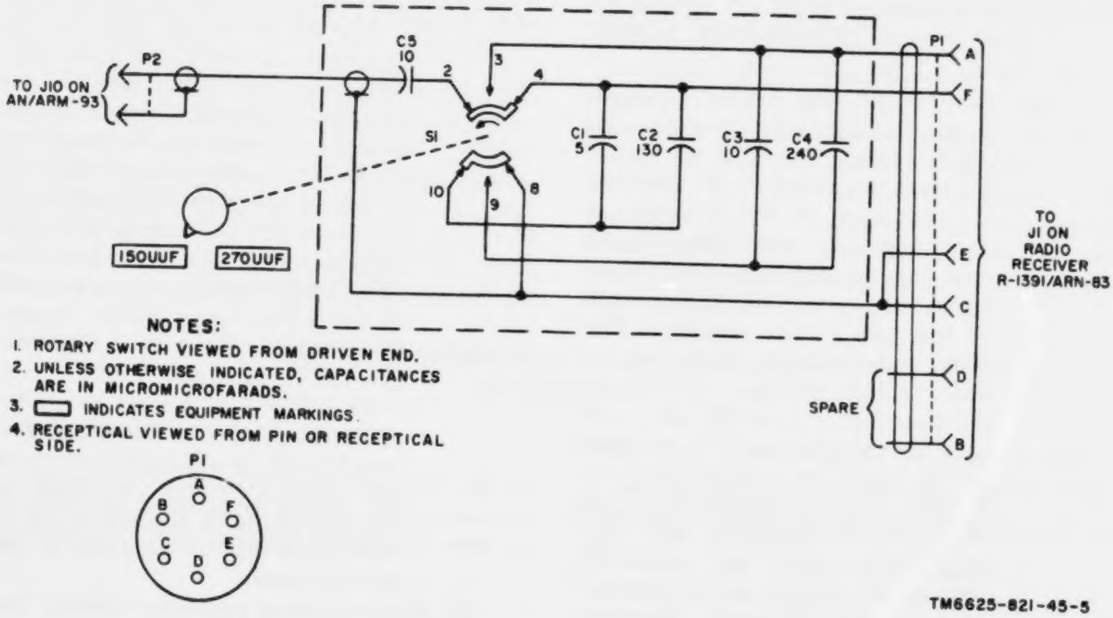
that normally is provided by the sense antenna in an aircraft installaion.

(*a*) *Sense antenna signal* (fig. 5-3). The signal across resistor R1 in the converter is used as the sense antenna signal and is applied to SENSE ANTENNA connector J10.

(*b*) *Sense antenna adapter.* From connector J10, the sense antenna signal is applied to the receiver through Simulator, Antenna SM-446/ARM-93 (sense antenna adapter). The sense antenna adapter (fig. 1-1) is a voltage-divider and capacity-matching network consisting of capacitors C1 through C5 and switch S1. When switch S1 is in the 150 UUF position, capacitor C5 combines with capacitors C1 and C2 to provide attenuation and impedance matching for the 150-micromicrofarad (uuf) input of the receiver. When switch S1 is in the 270 UUF position, capacitor C5 combines with capacitors C3 and C4 to provide attenuation and impedance matching for the 270-micromicrofarad input of the reciever.

(3) *Indicator circuit.* BEARING INDICATOR DS3 (fig. 5-3) indicates the bearing data that the receiver produces from the simulated loop and sense antenna signals supplied by the test set. The bearing data from the receiver is connected to the BEARING INDICATOR through switch S4D when RECEIVER-CONTROL switch S4 is in the RECEIVER position.

(4) *Power circuits* (fig. 5-4). An external 27.5-volt dc power source is connected to connector J7 in the test set. Fuse F1 provides 3-ampere protection for the 27.5 volts dc, and DC POWER switch S1 removes and applies this voltage to the power circuit. When switch S1 is set to ON, 27.5 volts dc is applied to DC indicator DS1 through current-limiting resistor R7, and lights the DC indicator. Switch S1 applies the 27.5 volts dc to the receiver through switches S4C in the test set, S302B in the control unit, and S4D in the test set. The 27.5 volts



NOTES:

1. ROTARY SWITCH VIEWED FROM DRIVEN END.
2. UNLESS OTHERWISE INDICATED, CAPACITANCES ARE IN MICROMICROFARADS.
3. ▭ INDICATES EQUIPMENT MARKINGS.
4. RECEPTICAL VIEWED FROM PIN OR RECEPTICAL SIDE.

Figure 1-1. Simulator, Antenna SM-446/ARM-93, schematic diagram.

dc is also applied to the inverter, which converts the 27.5 volts dc to 26 volts, 400 cps. (Refer to *c* below for a detailed description of the inverter.) The 26 volts, 400 cps from the inverter is connected to switch S302 B in the control unit through fuse F2. When switch S302B is set to any position other than OFF, the 26 volts, 400 cps is applied directly to the test set BEARING INDICATOR and to the receiver through switch S4D. The BEARING INDICATOR and the receiver use this voltage for reference and excitation of the synchros and resolvers. When the RECEIVER-CONTROL switch is set to CONTROL, switch S4B places a load across the inverter output. The load, comprised of inductor L11, resistor R10, and potentiometer R11, is used in the absence of the receiver that normally applies the load. Potentiometer R11 adjusts the size of the load to obtain the correct output voltage from the inverter. The 26 volts, 400 cps is also applied to the base of ac indicator control Q1 through current-limiting resistor R6. When the positive cycle of the 26 volts, 400 cps occurs, transistor Q1 conducts and applies ground to AC indicator DS2. The ground completes a dc path and lights the AC indicator. If the 26 volts, 400 cps is turned off, transistor Q1 will cut off and the AC indicator will no longer light.

(5) *Interconnect circuitry.* The TS-2502/ARM-93 provides interconnection between the control unit and the receiver when RECEIVER-CONTROL switch S4 is in the RECEIVER position. Detailed functioning of the interconnect circuitry is included in the interunit circuit functioning in section III of this chapter.

c. Inverter. The inverter (fig. 1-2) converts 275 volts dc to 26 volts, 400 cps ac. The inverter includes 400-cps oscillator Q1 coupled to a push-pull amplifier consisting of Q2 and Q3. Transistor Q1 oscillates with positive collector-to-base feedback introduced by the parallel resonant tank circuit comprising capacitor C2 and center-tapped inductor L1. At the resonant frequency of 400 cps, the tank circuit presents an impedance that applies a signal to the base of Q1 that is 180° out of phase with the collector output signal. A signal passing from the base to the collector is shifted 180° and, adding the tank circuit 180° phase shift, results in positive feedback to the base of Q1. The two opposite phases of the 400 cps signals are amplified by push-pull amplifier Q2 and Q3 and is applied to transformer T1. When transistor Q2 receives a positive-going oscillator signal, Q3 receives a negative-going signal. During the next half cycle, signal polarities are exchanged. The secondary of T1 steps up the ac signal to 26 volts. The ac voltage output is adjusted by variable resistor R1, which supplies base voltage to Q1.

d. Control Unit. Detailed functioning of the control unit is contained in section III of this chapter. Section III describes interunit circuit functioning. Figure 5-5 is the schematic diagram for the control unit.

e. Cables. Four cables are supplied with the test set. A schematic diagram of the cables is shown in figure 1-3. Cable Assembly, Power, Electrical CX-11569/ARM-93 (cable W1) connects the external 27.5-volt dc power source to the test set. Cable Assembly, Radio Frequency CG-2794/ARM-93 (cable W2) is a coaxial cable used to connect rf signals to the test set. Cable Assembly, Special Purpose, Electrical CX-11570/ARM-93 (cable W3) connects the LOOP ANTENNA output of the test set to the loop antenna input of the receiver. Cable Assembly, Special Purpose, Electrical CX-11571/ARM-93 (cable W4) extends the inverter away from the test set when repairing the inverter.

1-5. Detailed Functioning of Control Section

a. General. RECEIVER-CONTROL switch S4, in the CONTROL position, selects the portion of the test set that is used to test the control unit. CONTROL TEST switch S3 selects various control unit circuits and connects them to the CONTROL TEST terminals. An ohmmeter is connected to the CONTROL TEST terminals to measure the resistance of the selected circuits in the control unit. Subparagraphs *b* through *f* below describe detailed functioning of the control portion of the test set. Included in these subparagraphs are simplified schematic diagrams which will help in understanding the following descriptions and will also help in troubleshooting the control unit.

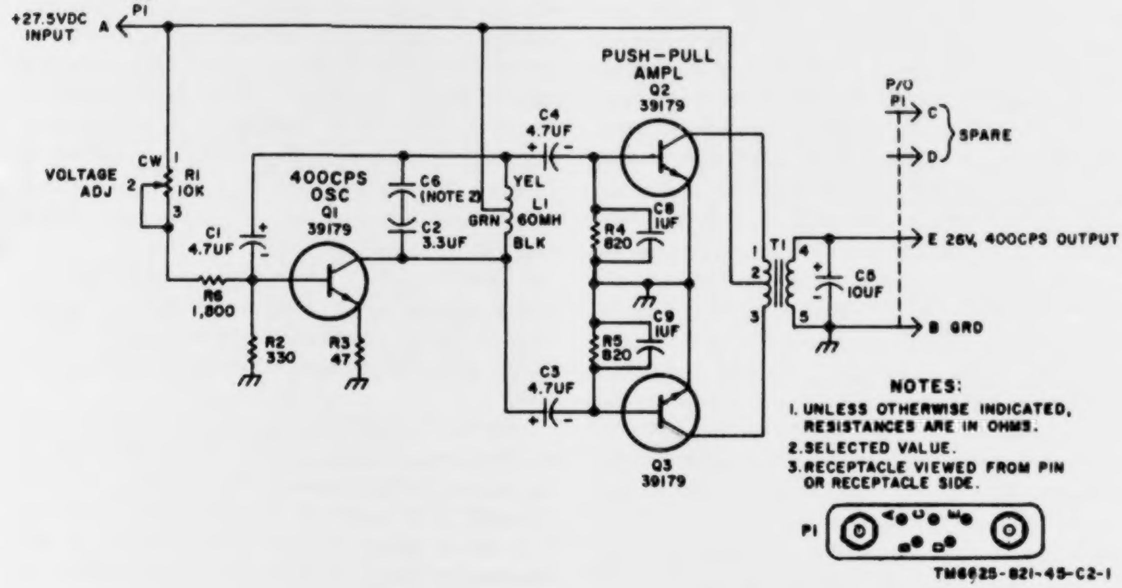

P/O PI
+27.5VDC INPUT
A
VOLTAGE ADJ
CW
1
2
3
RI 10K
CI 4.7UF
R6 1,800
R2 330
400CPS OSC
QI 39179
R3 47
C6 (NOTE 2)
C2 3.3UF
YEL
GRN
BLK
LI 60MH
C4 4.7UF
C3 4.7UF
R4 820
C8 1UF
R5 820
C9 1UF
PUSH-PULL AMPL
Q2 39179
Q3 39179
TI
1
2
3
4
5
C5 10UF
P/O PI
C
D
SPARE
E 26V, 400CPS OUTPUT
B GRD
NOTES:
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. SELECTED VALUE.
3. RECEPTACLE VIEWED FROM PIN OR RECEPTACLE SIDE.
PI
TM6625-821-45-C2-1

Figure 1-2. Inverter, Power, Static CV-2128/ARN-83, schematic diagram.

b. Tuning Meter and Tuning Control Information (fig. 5-6). Control unit tuning control information is indicated on BEARING INDICATOR DS3 A control unit synchro transmitter (tuning synchro B301) produces the tuning control information, and synchro receiver B2 in the BEARING INDICATOR receives the information. When the control unit function switch is in any position other than OFF, rear switch wafer S302B connects 26 volts, 400 cps from the power circuit in the test set to the rotors of the tuning synchro and rotors of the synchro receiver in the BEARING INDICATOR. The rotor in the tuning synchro induces a voltage into its stator windings. RECEIVER-CONTROL switch S4 connects these voltages to the stators in the BEARING INDICATOR synchro. A magnetic field is then set up in the BEARING INDICATOR synchro that has the same direction and phase as the magnetic field set up by the rotor in the tuning synchro. Since the rotor in the BEARING INDICATOR synchro follows this magnetic field, the BEARING INDICATOR will follow any rotation of the tuning synchro rotor. The test set supplies the control unit tuning meter with a current that deflects the needle to midscale. The test set power circuit applies 27.5 volts dc to resistor R9, which limits the current to approximately 50 microamperes. RECEIVER-CONTROL switch S4 connects the current to the control unit tuning meter. The test set power circuit is described in paragraph 1-4.

c. Manual LOOP Control Circuit (fig. 5-7). The test set provides a resistance check for the manual LOOP control circuit in the control unit. When set to position 1, CONTROL TEST switch S3 connects CONTROL TEST terminal J3 to common

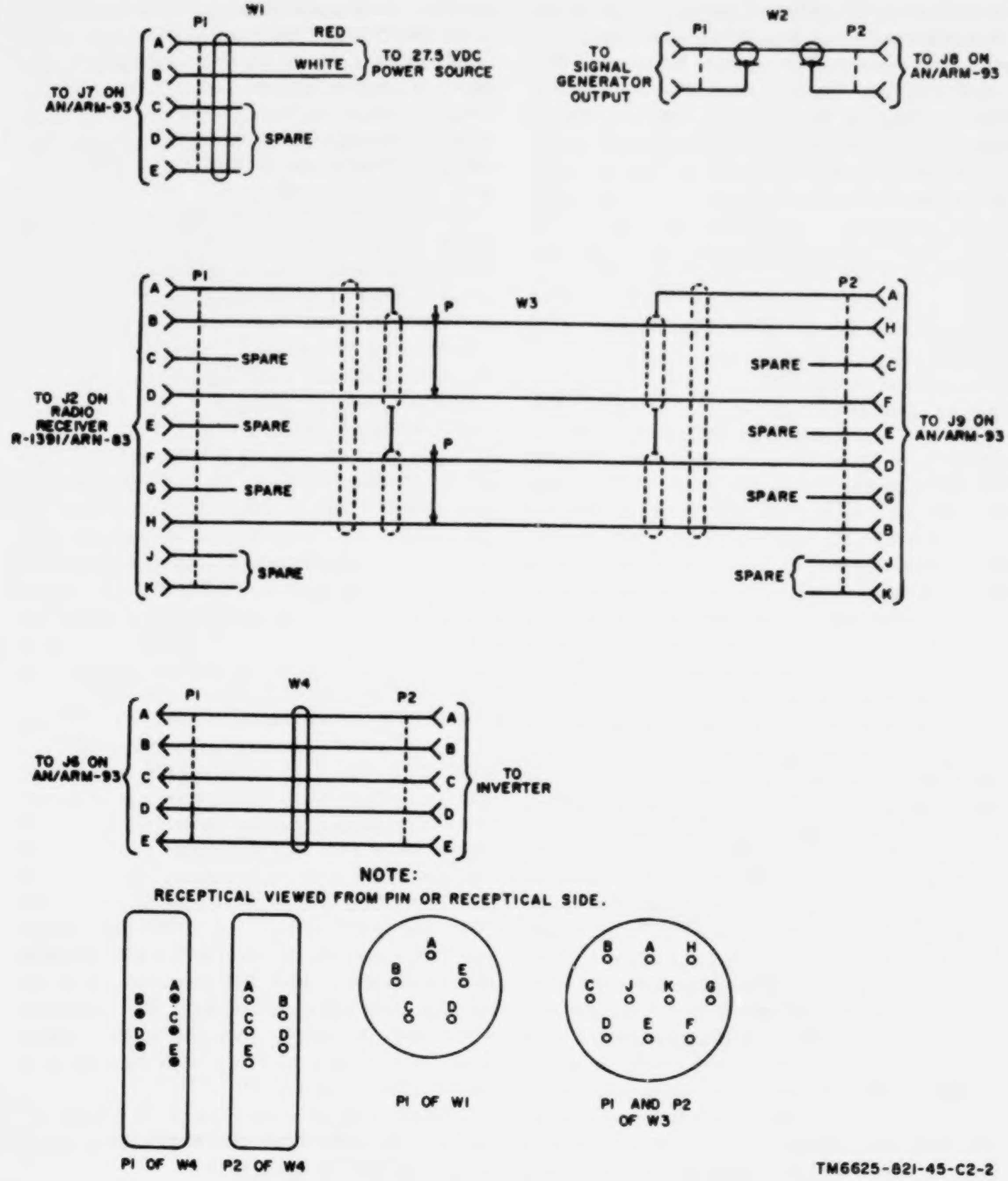

W1
P1
A
B
C
D
E
RED
WHITE
TO 27.5 VDC POWER SOURCE
TO J7 ON AN/ARM-93
SPARE
W2
P1
P2
TO SIGNAL GENERATOR OUTPUT
TO J8 ON AN/ARM-93
W3
P1
P2
P
TO J2 ON RADIO RECEIVER R-1391/ARN-83
TO J9 ON AN/ARM-93
SPARE
A
B
C
D
E
F
G
H
J
K
W4
P1
P2
TO J6 ON AN/ARM-93
TO INVERTER
NOTE:
RECEPTICAL VIEWED FROM PIN OR RECEPTICAL SIDE.
P1 OF W4
P2 OF W4
P1 OF W1
P1 AND P2 OF W3
TM6625-821-45-C2-2

Figure 1-3. Cables, schematic diagram.

pin 9 on LOOP switch S303. RECEIVER-CONTROL switch S4 connects ground to pins i and k of the control unit. With the LOOP switch set in each of its five positions, an ohmmeter connected across CONTROL TEST terminals J3 and J4 checks continuity of the LOOP switch and measures the resistance of resistors R306 and R307.

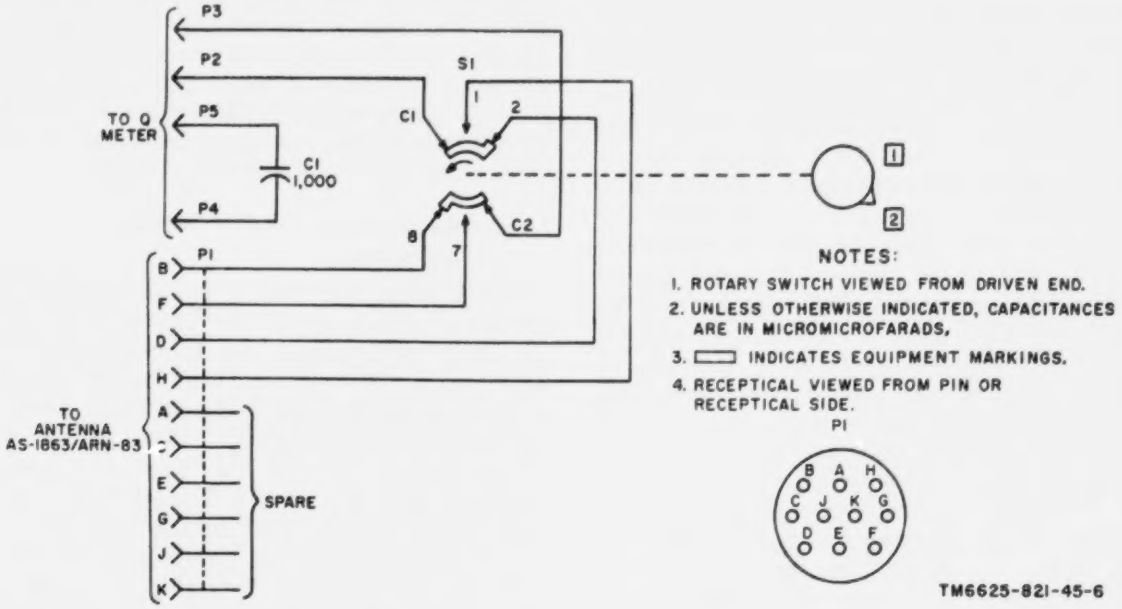
d. Bfo, Rf Gain Control, and Audio Gain Control Circuits (fig. 5-8). When an ohmmeter connected across CONTROL TEST terminal J3 and J4, the test set provides resistance and continuity checks of the beat frequency oscillator (bfo), rf gain control, and audio gain control circuits in the control unit. RECEIVER-CONTROL switch S4 connects CONTROL TEST jack J4 to pins f and T of connector P301. When set in position 2, CONTROL TEST switch S3 connects CONTROL TEST terminal J3 to the bfo circuit through front switch wafer S4A. Continuity of switch S301 in the control unit can now be checked. In position 3, the CONTROL TEST switch connects CONTROL TEST terminal J3 to the rf gain control circuit through front switch wafer S4C. When the control unit function switch is set to ADF, continuity of switch S302A is checked. When the function switch is set to ANT, the resistance between B and C of potentiometer R301C is checked. When the function switch is set to LOOP, the resistance of resistor R303 is series with the resistance between B and C of potentiometer R301C is checked. When the CONTROL TEST switch is in position 4, CONTROL TEST terminal J3 is connected to A of potentiometer R301C through rear switch wafer S4C. The resistance between A and C of potentiometer R301C is measured when the function switch is set to ADF or ANT. When the function switch is set to LOOP, the resistance of resistor R303 in series with the resistance between A and C of potentiometer R301C is measured. The audio gain control circuits are checked with the CONTROL TEST switch in positions 5 and 6. In position 5, CONTROL TEST terminal J3 is connected to the audio out terminal on the control unit through rear switch wafer S4C. When the function switch is set to ADF, the resistance between B and C of potentiometer R301A is measured. When potentiometer R301A is in its fully counterclockwise position, the resistance measured in between B and C of potentiometer R301A in parallel with the series resistance of resistors R304 and R305. In position 6, the CONTROL TEST switch connects CONTROL TEST terminal J3 to B of potentiometer R301B through front switch wafer S4B. When the function switch is set to ADF, the ohmmeter measures the resistance of the bridged-T network consisting of potentiometers R301A and R301B and resistors R304 and R305.

e. Function Control Circuit (fig. 5-9). Continuity checks on the function control circuit in the control unit are made with an ohmmeter connected across CONTROL TEST terminals J3 and J4 and with the CONTROL TEST switch set in positions 7 through 10 RECEIVER-CONTROL switch S4 connects CONTROL TEST terminal J4 to pin L of connector P301. In position 7, the CONTROL TEST switch connects CONTROL TEST terminal J3 to pin K on connector P301 through the front and rear wafers of switch S4C. The operation of rear switch S302B is then checked. When the CONTROL TEST switch is set to positions 8, 9, and 10, the operation of front switch wafer S302B is checked. In position 8, CONTROL TEST terminal J3 is connected through rear switch wafer S4A to the ADF function control line of the control unit. When the control unit function switch is set to each of its four positions, continuity will be indicated on the ohmmeter in positions ANT and LOOP and infinity indicated in positions OFF and ADF. When the CONTROL TEST switch is in position 9, CONTROL TEST terminal J3 is connected to the ANT function control through front switch wafer S4A. The ohmmeter will then indicate continuity when the function switch is set to ADF and LOOP and indicate infinity in positions OFF and ANT. When the CONTROL TEST switch is in position 10, CONTROL TEST terminal J3 is connected to the LOOP function control line through rear switch wafer S4A. The ohmmeter will indicate continuity when the function switch is set to ADF and ANT and indicate infinity in positions OFF and LOOP.

f. Range Control Circuit (fig. 5-10). Continuity and resistance checks on the range control circuit in the test set are made with an ohmmeter connected across CONTROL TEST terminals J3 and J4 and with the CONTROL TEST switch in positions 11, 12, and 13. RECEIVER-CONTROL switch S4 connects ground from the control unit to pin L of P301 and to CONTROL TEST terminal J4. CONTROL TEST terminal J3 is connected to the 190–400-kilocycle (kc) range control line through rear switch water S4B. The ohmmeter will then indicate the size of resistor R308 with the range switch set to 190–400 and indicate continuity with the range switch set to either of the other two positions. When the CONTROL TEST switch is set to position 12, CONTROL TEST terminal J3 is connected to the 400–850-kc range control line through front switch wafer S4D. The ohmmeter will indicate the value of resistor R308 with the range switch set to 400–850 and indicate continuity with the range switch set to either of the other two positions. When the CONTROL TEST switch is set to position 13, CONTROL TEST terminal J3 is connected to the 850–1750-kc range control line through front switch wafer S4C. The ohmmeter will indicate the value of resistor R308 with the range switch set to 850–1750 and indicate continuity with the range switch set to either of the other two positions.

1–6. Detailed Functioning of Loop Test Fixture

When in use, the loop test fixure (fig. 1–4) is mounted between the fixed loop antenna and a Q-meter. The position of loop test fixture switch S1 determines which of the two pairs of coils in the fixed loop antenna is connected to the Q-meter. Capacitor C1 in the loop test fixture supplies the Q-meter with the amount of capacitance required to measure the Q of the coils in the fixed loop antenna.



NOTES:

1. ROTARY SWITCH VIEWED FROM DRIVEN END.
2. UNLESS OTHERWISE INDICATED, CAPACITANCES ARE IN MICROMICROFARADS.
3. ▭ INDICATES EQUIPMENT MARKINGS.
4. RECEPTICAL VIEWED FROM PIN OR RECEPTICAL SIDE.

Figure 1–4. Test Fixture, Loop Antenna MT–3667/ARM–93, schematic diagram.

Section III. INTERUNIT CIRCUIT FUNCTIONING

1–7. General

Interunit functioning is included in this section to describe the functions of the control unit and how the test set interconnects these functions to the receiver when the RECEIVER-CONTROL switch is set to the RECEIVER position. This description, along with the interunit schematic diagrams in figures 5–11 through 5–16, will help maintenance personnel to troubleshoot the test set.

1-8. Function and Frequency Range Selection

a. Function Selection (fig. 5-11). Control unit function switch S302 connects 27.5 volts dc to the receiver and selects one of the three operating modes of the receiver When function switch S302 is set to any position other than OFF, 27.5 volts dc from the test set power circuit (para 1-4) is applied through contacts 9.5 and 11 of rear switch wafer S302B and out pin L on connector P301. This voltage is applied to the receiver through front and rear switch wafers S4D in the test set. When function switch S302 is set to ADF, front switch wafer S302B connects 27.5 volts dc to the antenna and loop mode circuits and opens the ADF mode circuit. The voltage for the antenna and loop circuits is connected to the receiver through front and rear switch wafers S4A. Setting function switch S302 to the ANT position applies 27.5 volts dc to two of the operating mode wires (ADF and LOOP) while leaving the third operating mode wire (ANT) open. Test set rear switch wafer S4A connects the 27.5 volts dc from ADF and LOOP mode wires to the receiver. When function switch S302 is set to the LOOP position, front switch wafer S302B connects 27.5 volts dc to the ADF and ANT mode circuits and opens the LOOP mode circuit. Front and rear switch wafers S4A connect the 27.5 volts dc from the ADF and ANT mode circuits to the receiver.

b. Frequency Range Selection (fig. 5-11) When selecting any one of the three frequency ranges of the receiver, range switch S304 connects 27.5 volts dc to two frequency range circuits and connects ground through a 25-ohm resistor to the desired frequency range circuit. If, for example, range switch S304 is set to the 190-400 position, rear switch wafer S304 connects 27.5 volts dc to the 400- to 850- to 1,750-kc range circuits. Front switch wafer S304 connects ground through resistor R308 to the 190- to 400-kc range circuit. Front switch wafers S4C an S4D in the test set connect the 27.5 volts dc from the two frequency range circuits (400-850 kc and 850-1,750 kc) to the receiver. Ground through a 25-ohm resistor (R308) is connected to the receiver through rear switch wafer S4B.

1-9. Tuning Control
(fig. 5-12)

The control unit tunes the receiver over each frequency range by remotely controlling a servomechanism that is connected mechanically to a variable capacitor in the receiver. When control unit function switch S302 is moved from OFF to ADF, ANT, or LOOP position, 26 volts, 400 cps from the test set power circuit is connected to the rotor of tuning synchro B301. This voltage also is connected through rear switch wafer S4D in the test set to the rotor of the servomechanism in the receiver. The rotor in tuning synchro B301 induces a voltage into its stator windings. Front and rear switch wafers S4A connect these voltages to the stators in the servomechanism in the receiver. A magnetic field is then set up in the receiver servomechanism that has the same direction and phase as the magnetic field set up by the rotor in tuning synchro B301. The rotor in the receiver servomechanism will therefore be in the same position as the rotor in tuning synchro B301. Since the rotor in tuning synchro B301 is geared to the TUNE control, the receiver is remotely tuned by rotating the TUNE control.

1-10. Manual Loop Control Circuit
(fig. 5-13)

The manual loop control circuit supplies a ground or either one of two phases of a 110-cps signal to a manual loop control circuit in the receiver. This manual loop control circuit in the receiver supplies a signal which drives the servo-driven goniometer. Two phases of 110-cps signals, derived from receiver 110-cps oscillator Q22, are applied through front and rear switch wafers S4B in the test set to LOOP switch S303 in the control unit. Switch S303 has two positions, R (right) or L (left), with spring return to its center or grounded position. In the center position, LOOP switch S303 applies ground to the manual loop control circuit in the receiver through front switch wafer S4B and GONIO DRIVE switch S2. The receiver requires this ground in order for the servo-driven goniometer to operate properly when the receiver is in the ADF mode. GONIO DRIVE switch S2 provides the ability to remove this ground which, in turn, reduces the gain of the servoamplifier that drives the servoamplifier that drives the servo-driven goniometer. With ground removed, a constant error can be applied to the servoamplifier with the receiver in ADF mode. When LOOP switch S303 is rotated to R (right), phase 1 of the 110-cps signal is connected to the manual loop control circuit in the receiver. This signal drives the servo-driven goniometer clockwise. When LOOP switch S303 is rotated to L (left), phase 2 of the 110-cps signal is connected to the manual loop control circuit in the receiver. The phase 2 signal is 180° out of phase with the phase 1 signal and, therefore, drives the servo-driven goniometer counterclockwise. When LOOP switch S303 is in the first position, left or right, the magnitude of the two 110-cps signals is attenuated by resistors R306 and R307. These two switch positions are slow-speed positions, providing a slower speed of goniometer rotation than the second switch position, left or right.

1–11. Manual Audio Gain Control Circuit
(fig. 5–14)

The audio output from the receiver is connected through front and rear switch wafers S4B in the test set to control unit function switch S302, which is shown in the ADF position. Variable resistors R301A and R301B, in conjunction with resistors R304 and R305, form a bridged-T attenuator, which presents a constant 600-ohm output impedance to the test set. When function switch S302 is set to either ANT or LOOP position, the variable resistors are shorted out by contacts 4 on the front and rear wafers of S302A. Note that turning the GAIN control clockwise rotates R301 counterclockwise. The audio signal from the control unit is applied to AUDIO OUT terminals J1 and J2 on the test set through rear switch wafers S4B and S4C. When a headphone plug is connected to PHONE jack J5, the PHONE jack connects itself to the audio output signal and disconnects the AUDIO OUT terminals from the signal. This eliminates the possibility of double loading the audio output circuit of the receiver.

1–12. Manual Rf Gain Control Circuit
(fig. 5–15)

A regulated +15 volts dc from voltage regulator Q30 and Q31 in the receiver is connected through rear switch wafer S4C in the test set to the control unit. When function switch S302 in the control unit is set to either ANT or LOOP position, the +15 volts dc is attenuated by variable resistor R301C. This voltage is applied through front switch wafer S4C in the test set to the receiver where the voltage is used to bias transistors Q2, Q4, Q7, and Q8. In the LOOP position of function switch S302, resistor R303 is added to the attenuating circuit and decreases the receiver rf gain to compensate for the increase in gain caused by switching out certain signal attenuating networks in the receiver rf stages during loop operation. Thus, receiver rf gain is practically the same in either antenna or loop operating modes for the same rf GAIN control setting. In ADF mode, variable resistor R301C is bypassed through rear switch wafer S302A, applying +15-volt dc bias without attenuation. Note that turning the GAIN control clockwise rotates R301 counterclockwise.

1–13. Bfo Switching and Tuning Meter Circuits
(fig. 5–16)

a. Bfo Switching Circuit. The control unit BFO-OFF switch controls operation of bfo Q21 in the receiver by supplying or removing emitter and base-bias voltages. A regulated source of +15 volts dc from the receiver is connected through rear switch wafer S4C in the test set to one side of BFO-OFF switch S301 in the control unit. Setting switch S301 to BFO connects the +15 volts dc through front switch wafer S4A in the test set to Q21 in the receiver, causing the bfo to oscillate. When the BFO-OFF switch is in the OFF position, the +15 volts dc is removed from Q21 and bfo cannot oscillate.

b. Tuning Meter Circuit. The intermediate frequency (if.) signal in the receiver is rectified and applied to tuning meter M301 in the control unit through rear switch wafer S4A in the test set. The rectified if. signal is proportional to the if. amplifier signal and reaches maximum amplitude when the receiver is tuned to the rf carrier of a radio station.

CHAPTER 2

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

2-1. General

The general support and depot maintenance procedures in this manual supplement the procedures outlined in the operator's and organizational maintenance manual. The systematic troubleshooting procedure, which begins with the operational and sectionalization checks that can be performed at an organizational level, is carried to a higher category in this manual. Sectionalizing and localizing techniques used in the following troubleshooting procedures are more advanced.

2-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a malfunctioning test set is to sectionalize the fault. Sectionalization means tracing the fault to a circuit. The second step is to localize the fault. Localization means tracing the fault to a defective part responsible for the abnormal condition.

b. Sectionalization. Sectionalization is accomplished by the two methods listed below.

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without performing tests or measurements. Some faults, such as burned-out resistors and arcing or shorted transformers, can often be located by sight, smell, and hearing. The majority of faults, however, must be isolated by checking voltages and resistances.

(2) *Troubleshooting chart.* Test Set, Direction Finder Set AN/ARM-93 consists of five units; the inverter, the control unit, the TS-2502/ARM-93, the sense antenna adapter, and the loop test fixture. The troubleshooting chart in paragraph 2-5 sectionalizes trouble in a defective test set by providing operating procedures, and listing the proper indications that should be obtained for each procedure. If any improper indications are obtained, the chart lists the probable trouble and suggests how to localize the trouble to a defective component.

c. Localization. Localize trouble to a defective component by performing the action listed in the *Correction* column of the troubleshooting chart (para 2-5). The troubleshooting chart sometimes makes reference to a schematic diagram of the faulty circuit. The defective component can be localized with the use of this schematic diagram.

d. Intermittent Troubles. In all of these tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble may often be made to appear by tapping or jarring the equipment. Make a visual inspection of the wiring and connections.

e. Resistor and Capacitor Color Code Diagrams. Resistor and capacitor color code diagrams (fig. 4-12 and 5-1) are provided to aid maintenance personnel in determining the value, voltage rating, and tolerance of capacitors and resistors.

2-3. Test Equipment Required

The following chart lists test equipment required for troubleshooting Test Set, Direction Finder Set AN/ARM-93:

Cautions:

1. **The test set inverter is transistorized. Use all precautions to avoid transistor damage.**

2. **Make test equipment connections carefully so that shorts will not be caused by exposed test equipment connectors. Tape or sleeve (spaghetti) test prods or clips as necessary to expose only the amount needed to make contact to the circuit under test.**

3. **Observe the polarity of the 27.5 volt dc power source. Polarity reversal may damage the transistors or electrolytic capacitors in the circuits. This equipment requires a negative ground. If a battery eliminator is used as the 27.5 volt dc power source, it must have good voltage regulation and low ac ripple. Good regulation is important because the output voltage of a supply that has poor regulation may exceed the maximum voltage rating of the transistors in the inverter.**

Test equipment	Technical manual	Common name
Signal Generator AN/GRM–50	TM 11–6625–573–15	Signal generator.
Voltmeter, Meter ME–30A/U or Voltmeter, Electronic ME–30*/U.[a]	TM 11–6625–320–12	Voltmeter.
Multimeter ME–26/U[b]	TM 11–6625–200–12	Multimeter
Q Meter TS–617(*)/U[c]	TM 11–2635A	Q-meter.

[a] Indicates Voltmeters, Electronic ME–30B/U and ME–30C/U.

[b] Indicates Multimeters ME–26A/U, ME–26B/U, and ME–26C/U.

[c] Indicates Q Meters TS–617/U, TS–617A/U, and TS–617B/U.

Section II. TROUBLESHOOTING PROCEDURES

2–4. Test Setup

All bench tests of the test set require various types of test equipment, depending on the particular test. To prepare the test set for troubleshooting, perform the initial setup procedures described below.

a. Set the switches on the test set to the following positions:

(1) DC POWER to OFF.
(2) GONIO DRIVE to ON.
(3) RECEIVER-CONTROL to CONTROL.
(4) CONTROL TEST to 1.

b. Set the controls and switches on the control unit to the following positions:

(1) Function switch to OFF.
(2) BFO-OFF switch to OFF.
(3) GAIN control to fully counterclockwise.
(4) Range switch to 190–400.
(5) TUNE control fully counterclockwise.

c. Connect the test set to a 27.5-volt dc power source.

2–5. Troubleshooting Chart

Step	Procedure	Proper indication	Probable trouble for improper indication	Correction
1	Connect the DC probe of the multimeter to the test point in the center of the 3A fuse cap.	The multimeter should indicate 27.5 volts dc.	Fuse F1 blown out	Replace fuse F1 with a 3-ampere fuse.
2	Set the test set DC POWER switch to ON.	DC indicator lamp should light.	*a.* DC indicator lamp DS1 burned out. *b.* Resistor R7 defective	*a.* Replace lamp DS1. *b.* Replace resistor R7.
3	Set the control unit function switch to the ADF position.	AC indicator lamp should light.	*a.* AC indicator lamp DS2 burned out. *b.* Transistor Q1 defective *c.* Resistor R6 defective	*a.* Replace lamp DS2. *b.* Replace transistor Q1. *c.* Replace resistor R6.
4	Connect the AC probe of the multimeter to the test point in the center of the 1A fuse cap.	The multimeter should indicate 26 volts ac.	*a.* The inverter load is out of adjustment if the multimeter indicates ±26 volts ac. *b.* If the 26 volts ac is not present, either fuse F1 is blown or the inverter is defective.	*a.* Adjust the inverter load (para 3–14). *b.* Replace fuse F1 with a 1-ampere fuse. If fuse F1 is not blown, troubleshoot the inverter by taking voltage measurements (para 2–6).
5	Connect the equipment as described in paragraph 4–9. Perform step 1 of the procedure in paragraph 4–9*c*.	Proper indications are listed in the *Performance standard* column of the procedure in paragraph 4–9*c*.	Defective circuit in either the control unit or the TS–2502/ARM–93.	Refer to the schematic diagram in figure 5–7 to localize the trouble.
6	Perform steps 2, 3, 4, 5, and 6 of the procedure in paragraph 4–9*c*.	Same as in step 5 above.	Same as step 5 above	Refer to the schematic diagram in figure 5–8 to localize the trouble.
7	Perform steps 7, 8, 9, and 10 of the procedure in paragraph 4–9*c*.	Same as in step 5 above.	Same as step 5 above	Refer to the schematic diagram in figure 5–9 to localize the trouble.
8	Perform steps 11, 12, and 13 of the procedure in paragraph 4–9*c*.	Same as in step 5 above.	Same as step 5 above	Refer to the schematic diagram in figure 5–10 to localize the trouble.
9	Connect and adjust the equipment as described in paragraph 4–15. Perform step 1 of the procedure in paragraph 4–15*c*.	Refer to *Performance standard* column in paragraph 4–9*c*.	Defective circuit in the receiver circuitry of the TS–2502/ARM–93.	Refer to the schematic diagram in figure 5–3 to localize the trouble.

Step	Procedure	Proper indication	Probable trouble for improper indication	Correction
10	Connect the equipment as described in paragraph 4–17. Perform steps 1 and 2 of the procedure in paragraph 4–17*c*.	Refer to the *Performance standard* column of the procedure in paragraph 4–17c.	*a.* Inductor L3 and/or inductor L8 out of adjustment. *b.* Defective component in the loop antenna simulator circuit in the test set.	*a.* Adjust inductors L3 and L8 as described in paragraph 3–16. *b.* Troubleshoot the loop antenna simulator circuit by taking voltage measurements as described in paragraph 2–7.
11	Connect the equipment as described in paragraph 4–18. Perform steps 1 and 2 of the procedure in paragraph 4–18*c*.	Refer to the *Performance standard* column of the procedure in paragraph 4–18c.	Defective component in the loop antenna simulator circuit in the test set.	Troubleshoot the loop antenna simulator circuit as described in paragraph 2–7.
12	Connect the equipment as described in paragraph 4–11. Perform step 1 of the procedure in paragraph 4–11*c*.	Refer to the *Performance standard* column of the procedure in paragraph 4–11*c*.	Defective switch ----------------	Replace the switch.
13	Perform step 2 of the procedure in paragraph 4–11*c*.	Same as step 12 above.	Capacitor C1 defective -----------	Replace capacitor C1.
14	Connect the equipment as described in paragraph 4–13. Perform steps 1 and 2 of the procedure in paragraph 4–13*c*.	Refer to the *Performance standard* column of the procedure in paragraph 4–13*c*.	*a.* If improper indications are obtained from steps 1 and 2 of the procedure in paragraph 4–13*c*, capacitor C5 is defective. *b.* If an improper indication is obtained from step 1 and not step 2 the procedure in paragraph 4–13*c*, capacitor C1 and/or capacitor C2 is defective. *c.* If an improper indication is obtained from step 2 and not step 1 of the procedure in paragraph 4–13*c*, capacitor C3 and/or capacitor C4 is defective.	*a.* Replace capacitor C5. *b.* Replace capacitor C1 and/or capacitor C2. *c.* Replace capacitor C3 and/or capacitor C4.

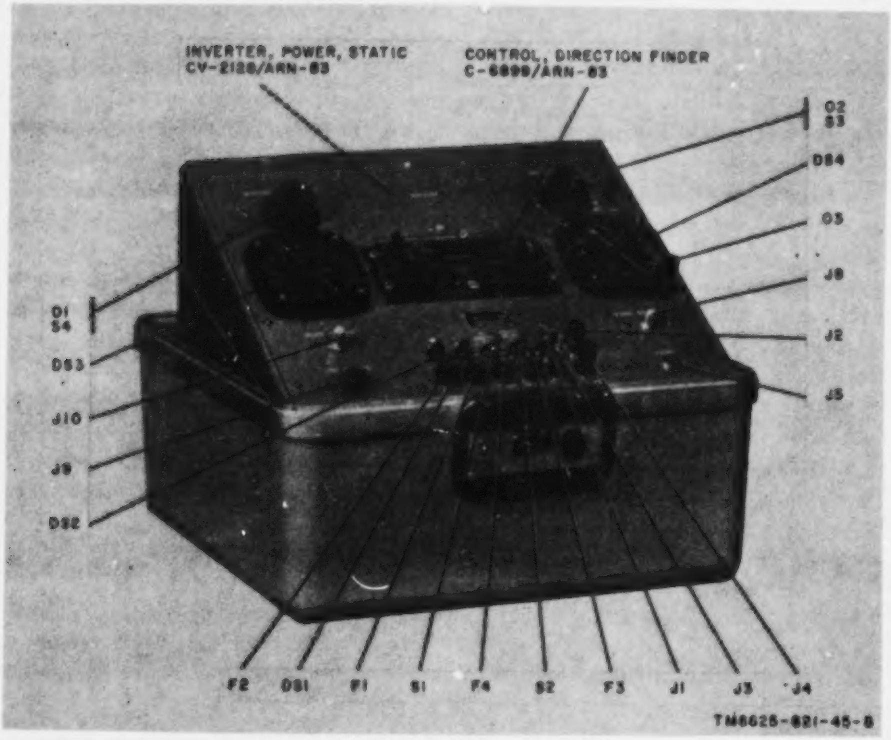

INVERTER, POWER, STATIC
CV-2128/ARN-83
CONTROL, DIRECTION FINDER
C-6899/ARN-83
O2
S3
DS4
O3
J8
J2
J5
D1
S4
DS3
J10
J9
DS2
F2
DS1
F1
S1
F4
S2
F3
J1
J3
J4
TM6625-821-45-8

Figure 2-1. Test set, front panel.

2-6. Voltage Measurements for Inverter

If the trouble has been traced to the inverter, localize the trouble by voltage measurements.

a. Equipment Setup. Set the test set DC POWER switch to OFF, and set up the equipment as follows:

(1) Remove the inverter from the test set (para 3-3*a*).

(2) Connect one end of cable W4 to connector J6 in the test set.

(3) Connect the other end of cable W4 to the connector on the inverter.

(4) Connect the test set to a 27.5-volt dc power source.

b. Switch Positions. Set the switches on the test set as follows:

(1) RECEIVER-CONTROL to CONTROL.

(2) DC POWER to ON.

(3) All other switches may be set to any position.

c. Voltage Measurement. Use the voltmeter to make the voltage measurements illustrated in figure 2-8. Refer also to the dc resistances of transformers and coils (*e* below).

d. Adjustment. After the trouble has been localized and repaired, refer to TM 11-5826-225-35 to adjust the inverter.

e. Dc Resistances of Transformers and Coils in Inverter.

Transformer or coil	DC resistance (ohms)
L1	Yellow-green: 2 Green-black: 2
T1	1-2: 0.5 2-3: 0.5 4-5: 2.6

2-7. Troubleshooting Loop Antenna Simulator Circuit

If the trouble has been traced to the loop antenna simulator circuit, localize the trouble as follows:

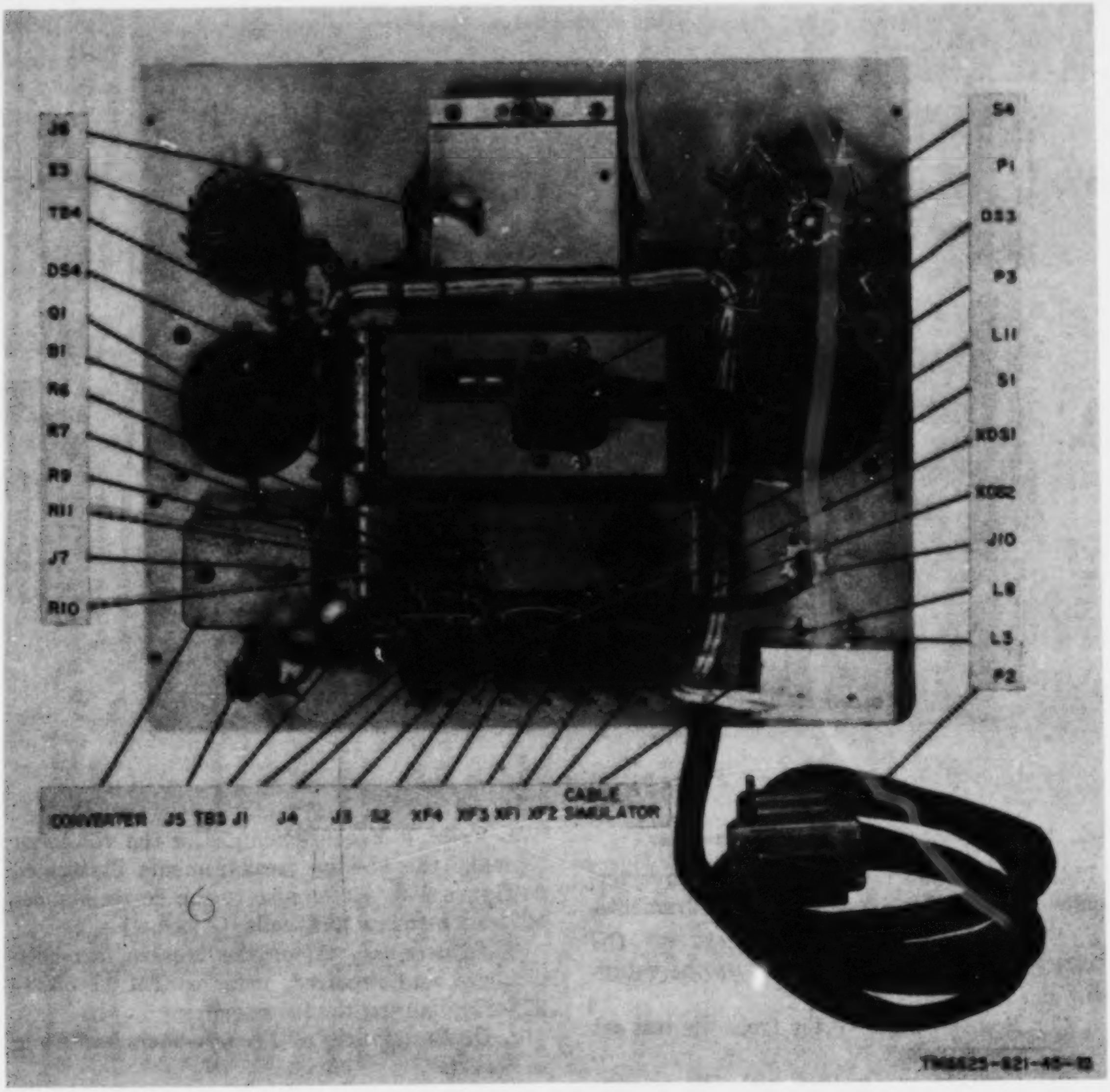

J6
S3
TB4
DS4
Q1
B1
R6
R7
R9
R11
J7
R10
S4
P1
DS3
P3
L11
S1
XDS1
XDS2
J10
L8
L3
P2
CONVERTER
J5
TB3
J1
J4
J3
S2
XF4
XF3
XF1
XF2
CABLE SIMULATOR
TM6625-821-45-13

Figure 2-2. Rear side of test set, front panel.

a. Equipment Setup.

(1) Remove the test set front panel (para 3-7).

(2) Remove the covers from the converter and cable simulator circuits (fig. 2-2).

(3) Connect the equipment as shown in figure 4-12. Construction details of the test jig used in the equipment setup is illustrated in figure 4-3.

b. Switch and Control Positions.

(1) Adjust the LOOP SIMULATOR on the test set so the needle points to N (0°). (All other switches on the test set may be set to any position.)

(2) Adjust the signal generator as follows:

(*a*) Set the RANGE selector to 530-1800 kc.

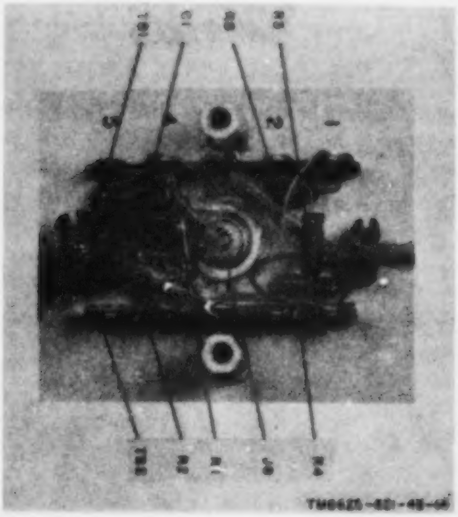

R5
R6
C1
TB1
1
2
5
R4
J6
R1
R2
TB2
TM6625-821-45-

Figure 2-3. Converter circuit.

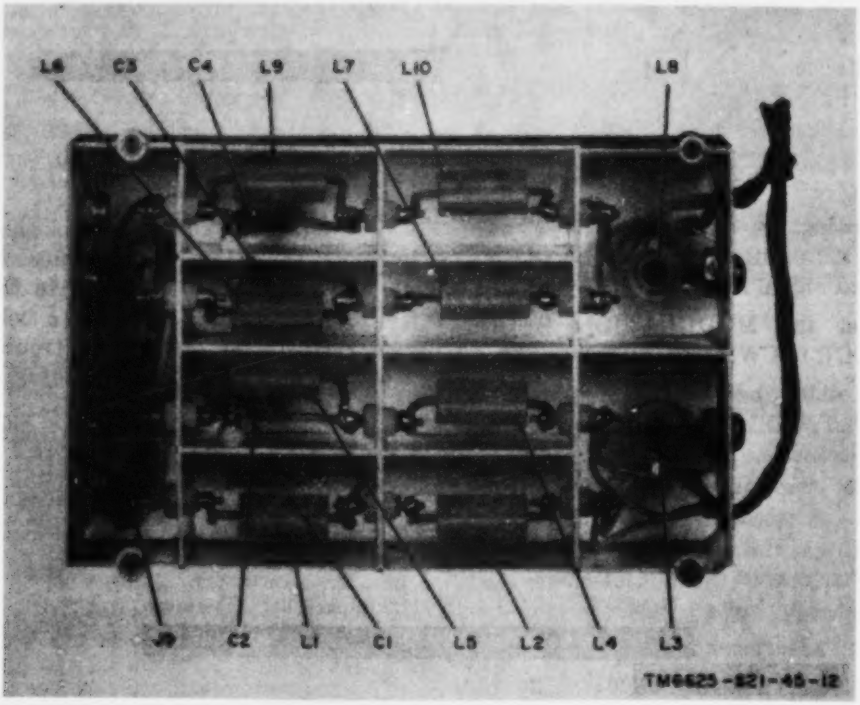

L6
C3
C4
L9
L7
L10
L8
J9
C2
L1
C1
L5
L2
L4
L3
TM6625-821-45-12

Figure 2-4. Cable simulator circuit.

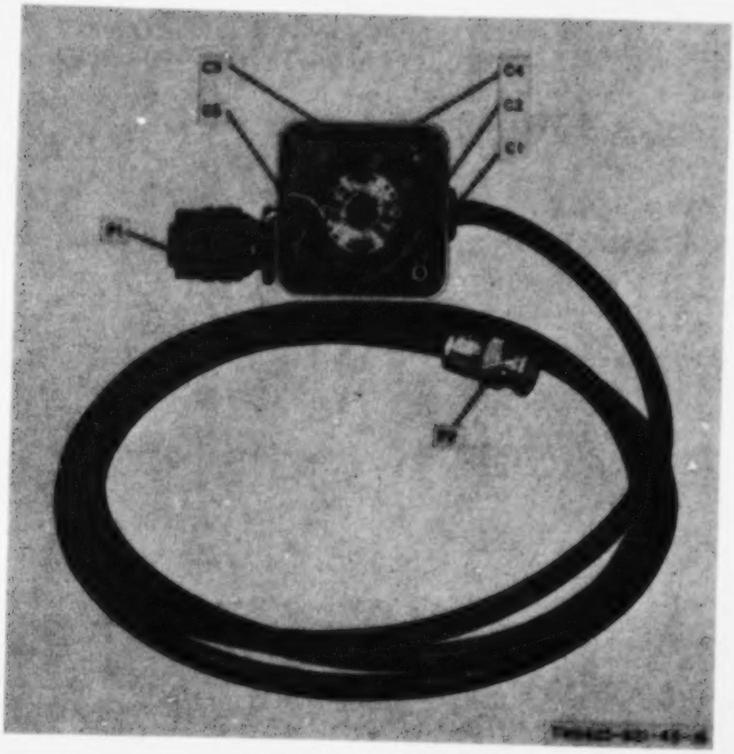


Figure 2-5. Sense antenna adapter, internal view.

(*b*) Adjust the FREQUENCY and VERNIER controls until the output signal is 850 kc.

(*c*) Set the MODULATION SELECTOR to CW.

(*d*) Rotate the MODULATION AMPLITUDE control fully counterclockwise.

(*e*) Set the coarse ATTENUATOR to 3.0 volts.

(*f*) Adjust the VERNIER ATTENUATOR until the output meter indicates 3.0 volts.

c. Voltage Measurements.

(1) Use the voltmeter to make the voltage measurements illustrated in figure 2-11. Refer to the dc resistances of the coils (*e* below).

(2) Adjust the LOOP SIMULATOR on the test set so the needle points to E (90°). Use the voltmeter to make the voltage measurement illustrated in figure 2-12. Refer to the dc resistances of the coils (*e* below).

d. Adjustment. After the trouble has been localized and repairs made, adjust variable inductors L3 and L8 (para 3-16).

e. Dc Resistances of Coils in the Loop Antenna Simulator Circuit.

Coil	Dc resistance (ohms)
L1	0
L2	0
L3 in parrallel with stator winding of resolver B1.	0.3
L4	0
L5	0
L6	0
L7	0
L8 in parallel with stator winding of resolver B1.	0.3
L9	0
L10	0

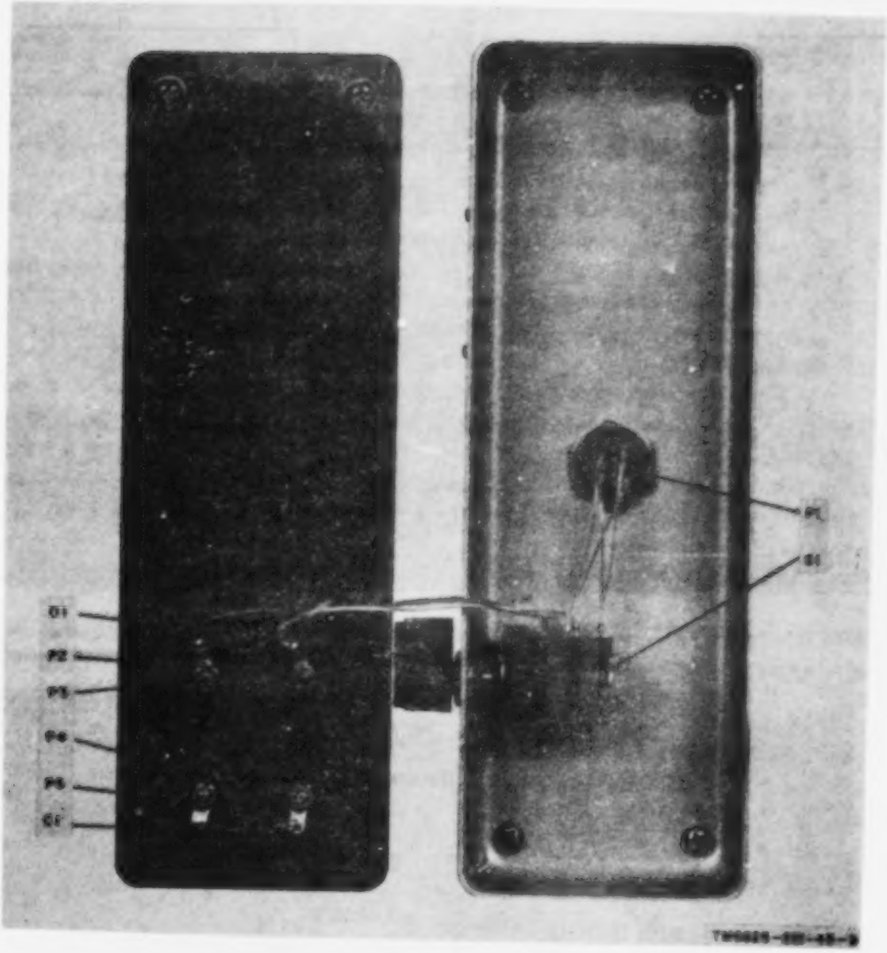

D1
P2
P3
P4
P5
C1
P1
S1
TM6625-821-45-9

Figure 2-6. Loop test fixture, internal view.

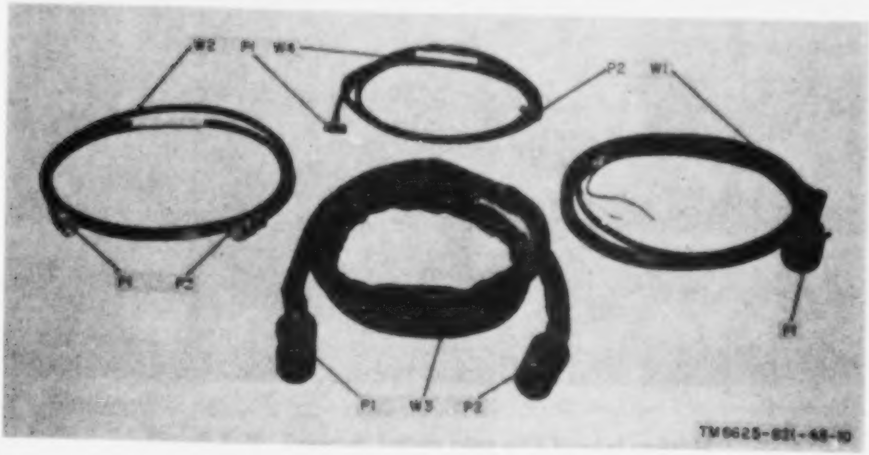
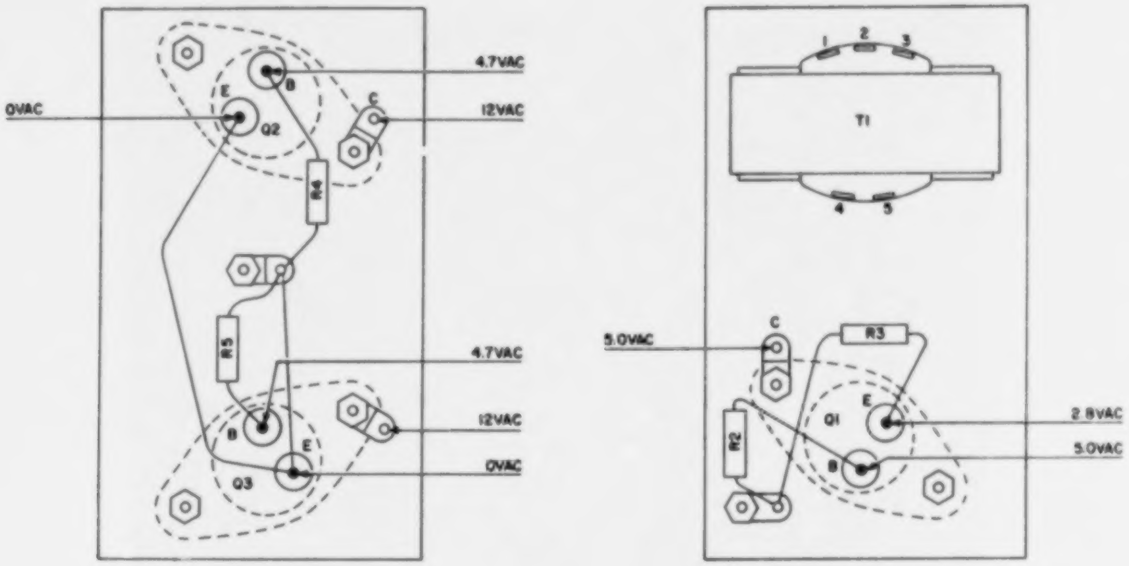

W2
P1
W4
P2
W1
P1
P2
P1
P1
W3
P2
TM6625-821-45-10

Figure 2-7. Cables.


0VAC
4.7VAC
12VAC
E
B
C
Q2
R4
R5
4.7VAC
12VAC
0VAC
B
E
Q3
1
2
3
T1
4
5
5.0VAC
C
R3
R2
E
Q1
B
2.8VAC
5.0VAC

NOTES:

1. VOLTAGE MEASUREMENTS TAKEN WITH INVERTER CONNECTED TO TEST SET.
2. TEST SET DC POWER SWITCH TO ON AND RECEIVER-CONTROL SWITCH TO CONTROL.
3. ALL VOLTAGES ARE MEASURED FROM CHASSIS GROUND.

TM6625-821-45-43

Figure 2-8. Inverter voltage diagram.

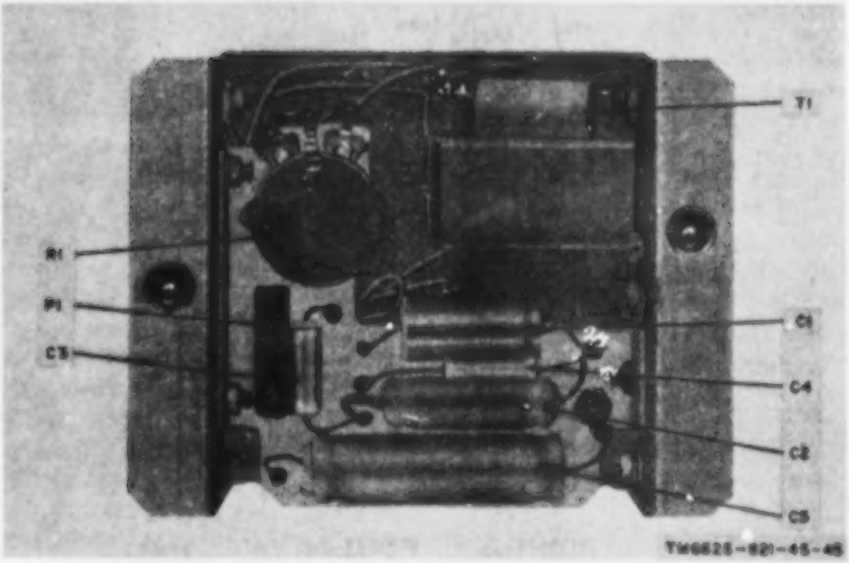

R1
P1
C3
T1
C1
C4
C2
C5
TM6625-821-45-45

Figure 2-9. Inverter, bottom view.

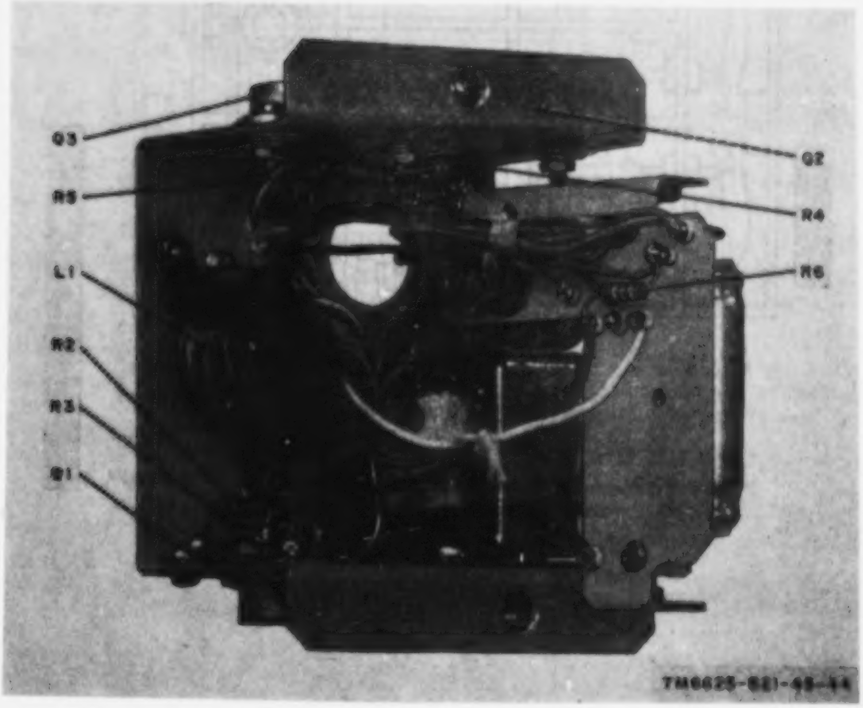
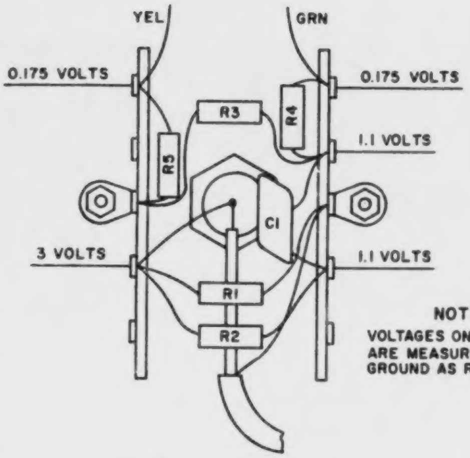
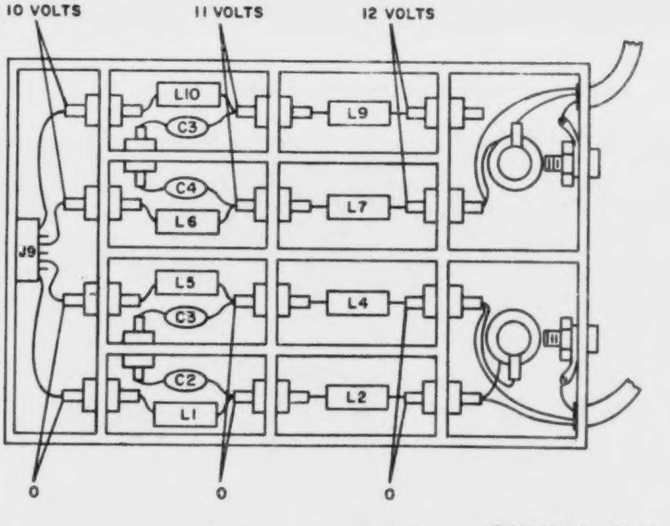

Q3
R5
L1
R2
R3
Q1
Q2
R4
R6
TM6625-821-45-44

Figure 2-10. Inverter, bottom view with bracket removed.


YEL
GRN
0.175 VOLTS
0.175 VOLTS
R3
R4
R5
1.1 VOLTS
C1
3 VOLTS
1.1 VOLTS
R1
R2

NOTE:
VOLTAGES ON CONVERTER ARE MEASURED WITH CHASSIS GROUND AS REFERENCE.

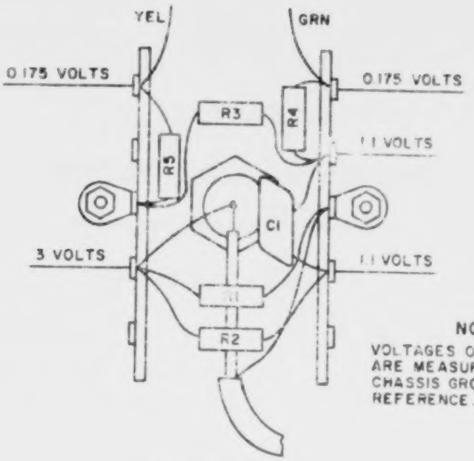
A. CONVERTER


10 VOLTS
11 VOLTS
12 VOLTS
L10
C3
L9
C4
L6
L7
J9
L5
C3
L4
C2
L1
L2
0
0
0

B. CABLE SIMULATOR

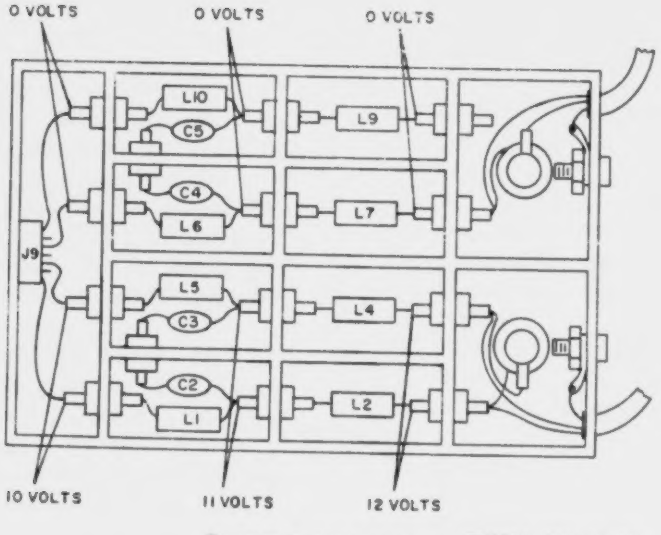
TM6625-821-45-46

Figure 2-11. Loop antenna simulator circuit voltage diagram, with LOOP SIMULATOR set to 0°.


YEL
GRN
0.175 VOLTS
0.175 VOLTS
R3
R4
R5
1.1 VOLTS
C1
3 VOLTS
1.1 VOLTS
R1
R2

NOTE:
VOLTAGES ON CONVERTER ARE MEASURED WITH CHASSIS GROUND AS REFERENCE.

A. CONVERTER


0 VOLTS
0 VOLTS
0 VOLTS
L10
C5
L9
C4
L6
L7
J9
L5
C3
L4
C2
L1
L2
10 VOLTS
11 VOLTS
12 VOLTS

B. CABLE SIMULATOR TM6625-821-45-47

Figure 2-12. Loop antenna simulator circuit voltage diagram, with LOOP SIMULATOR set to 90°.

CHAPTER 3

REPAIRS AND ALIGNMENT

Section I. REPAIRS

3-1. Parts Replacement Techniques

a. General. Subparagraphs *b* and *c* below provide parts replacement techniques for the converter and cable simulator circuits in Test Set, Radio TS-2502/ARM-93. Parts for the other circuits in TS-2502/ARM-93 can be easily replaced. The following general precautions should be observed when replacing parts in this equipment.

(1) When soldering or unsoldering components, solder quickly to allow as little heat conduction as possible. Whenever wiring permits, use a heat sink (such as long-nosed pliers) between the solder joint and the part. Use approximately the same length and dress of leads as used originally.

(2) When the soldering iron is used with ac, use an isolation transformer between the iron and the line. Check soldering irons for shorts to the iron tip before using.

(3) In some cases, power transistors are mounted on heat sinks. When replacing power transistors, always replace the insulating washer between the transistors and the heat sink if an insulator is used. Before installing the mica or fiber washers, treat them with a film of silicone fluid or equivalent to help in the transfer of heat. After the transistor is mounted and before making connections, check from transistor case to ground for effective insulation.

(4) Whenever an electrical part, such as a resistor, capacitor, or coil is to be removed, note the exact position of the part before removing it. Replace the part in the same position.

(5) When tightening the two setscrews in a collar-type clamp, the setscrews must be tightened against the center of the gear (or other mechanical parts) quarter segments.

b. Parts Replacement for Converter Circuit.

(1) Remove the test set front panel (para 3-7).

(2) Remove the two screws from the cover that shields the converter circuit (fig. 2-2).

(3) Lift the cover away from the test set.

(4) Replace the defective parts (*a* above).

(5) Replace the cover over the converter circuit and secure it with the two screws.

(6) Replace the test set front panel (para 3-12).

c. Parts Replacement for Cable Simulator Circuit.

(1) Remove the test set front panel (para 3-7).

(2) Remove four screws from the plate that covers the shield in which the cable simulator circuit is mounted (fig. 2-2). Remove the plate.

(3) Replace the defective parts (*a* above).

(4) Replace the plate over the shield of the cable simulator circuit and secure with the four screws.

(5) Replace the test set front panel (para 3-12).

3-2. Removal and Disassembly Techniques

a. Procedures for removing and disassembling major components in the test set are described in paragraphs 3-3 through 3-6. Removal of the test set front panel is described in paragraph 3-7. The corresponding reassembly and replacement procedures are described in paragraphs 3-8 through 3-12. Paragraphs 3-8 through 3-12 also include instructions for lubrication that is performed during reassembly of the major components.

b. A special tool is required to disassemble the LOOP SIMULATOR (para 3-5*b*) and BEARING INDICATOR (para 3-6*b*). The tool is a number 4 Presto Combination Hand and Pointer Puller, manufactured by G. D. Gustason Manufacturing Company, Chicago, Ill.

3-3. Removal and Disassembly of Inverter

a. Removal.

(1) Remove the INVERTER plate by removing the two screws that secure it to the test set front panel.

(2) Loosen the screws (located on each side of the inverter) that secure the inverter to the test set.

(3) Firmly grasp the inverter, and pull it straight back from the test set front panel.

b. Disassembly. Disassemble the inverter if required.

3-4. Removal and Disassembly of Control Unit

a. Removal.

(1) Loosen the Dzus fasteners in each corner of the control unit.

(2) Lift the control unit out of the test set until the connector on the rear of the control unit is accessible.

(3) Disconnect P1 of the test set from the connector on the rear of the control unit.

b. Disassembly. Refer to TM 11-5826-225-35, for the control unit disassembly procedures.

3-5. Removal and Disassembly of LOOP SIMULATOR

a. Removal.

(1) Remove the test set front panel (para 3-7).

(2) Remove the cover that shields the converter circuit (fig. 2-2).

(3) Unsolder the two twisted pairs of leads and the two shields from terminal board TB4 mounted on the rear side of the LOOP SIMULATOR. Label leads so they can be identified for replacement of the LOOP SIMULATOR.

(4) Unsolder the yellow and green leads of resolver B1 from the converter circuit terminal boards.

(5) Remove the three screws and nuts that secure the LOOP SIMULATOR to the test set front panel.

(6) Remove the LOOP SIMULATOR from the front of the test set.

b. Disassembly (fig. 3-1).

(1) Remove eight machine screws (28) and eight lockwashers (27).

(2) Pull rear housing (26) away from front cover (5).

(3) Remove gasket (25).

(4) Grasp resolver B1 (21) with one hand and front cover (5) with the other hand. With a slight twisting motion, separate front cover (5) from resolver housing (17).

(5) Loosen two setscrews (2 and 3), and remove knob (1).

(6) Remove spring washer (4).

(7) Slide the shaft of drive gear (7) out of front cover (5).

(8) Remove shaft sleeve (6) from front cover (5).

Note. If desired, dial window (9) can now be removed by carefully pushing around the outer edge of dial window (9) toward the rear of front cover (5).

(9) Use a pointer puller (para 3-2*b*) to pull needle (11) straight back off the shaft of resolver B1 (21).

(10) Remove dial retainer (10) from resolver housing (17).

(11) Lift dial (12) out of resolver housing (17).

(12) Lift idler gear (16) out of resolver housing (17).

(13) Loosen two setscrews (14 and 15). These two setscrews are accessible through a hole in the smaller rim of resolver housing (17).

(14) Slide resolver gear (13) off the shaft of resolver B1 (21).

(15) Unsolder the resolver wires from terminal board TB4 (22).

(16) Remove terminal board TB4 (22) from resolver housing (17) by removing machine screw (24) and lockwasher (23).

(17) Remove resolver B1 (21) by removing three machine screws (20), three lockwashers (19), and three resolver clamps (18).

3-6. Removal and Disassembly of BEARING INDICATOR

a. Removal.

(1) Remove the test set front panel as described in paragraph 3-7.

(2) Disconnect P3 from the connector on the rear of the BEARING INDICATOR.

(3) Remove the four screws and nuts that secure the BEARING INDICATOR to the test set front panel.

(4) Remove the BEARING INDICATOR from the front of the test set.

b. Disassembly (fig. 3-2).

(1) Remove four machine screws (12) and four lockwashers (13).

(2) Extend connector J1 (14) from rear housing (16), and unsolder the wires from connector J1 (14). Label each lead so they can be identified for reassembly.

(3) Remove eight machine screws (18) and eight lockwashers (19).

(4) Separate rear housing (16) from front cover (11).

(5) Grasp synchro B2 (1) with one hand and front cover (11) with the other hand. With a slight twisting motion, separate front cover (11) from synchro housing (5).

Note. **If desired, dial window (9) can now be removed by carefully pushing around the outer edge of dial window (9) toward the rear of front cover (11).**

(6) Using a pointer puller (para 3-2*b*), pull needle (7) straight back off the shaft of synchro B2 (1).

(7) Remove dial retainer (8) from synchro housing (5).

(8) Lift dial (6) out of synchro housing (5).

(9) Remove synchro B2 (1) by removing three machine screws (2), three lockwashers (3), and three synchro clamps (4).

3-7. Removal of Test Set Front Panel

a. Remove the 12 screws around the perimeter of the test set front panel.

b. Lift the test set front panel out and away from the case.

c. Pull the power and pendant cables through the hole in the storage compartment until the cables are of sufficient length to enable front panel to lie on the bench beside the case.

d. Lay the front panel on the bench.

3-8. Replacement of Inverter

a. Orient the inverter so the connector on the rear of the inverter will mate with J6 in the test set.

b. Place the inverter in the test set; make sure the connector on the inverter makes positive connection with J6 in the test set.

c. Secure the inverter to the test set with the screw on each end of the inverter.

d. Place the INVERTER plate over the opening in the front panel for the inverter. Secure the plate to the front panel with the two screws.

3-9. Reassembly and Replacement of Control Unit

a. Reassembly. Refer to TM 11-5826-225-35 for the control unit reassembly procedures.

b. Replacement.

(1) Bring connector P1 out the CONTROL opening on the test set front panel.

(2) Connect P1 to the connector on the rear of the control unit.

(3) Slide the control unit into the CONTROL opening.

(4) Secure the control unit to the test set front panel with the Dzus fasteners located in each corner of the control unit.

3-10. Reassembly and Replacement of LOOP SIMULATOR

a. Reassembly (fig. 3-1).

(1) Mount resolver B1 (21) on the rear of resolver housing (17), and secure with three resolver clamps (18), three lockwashers (19), and three machine screws (20).

(2) Secure terminal board TB4 (22) to resolver housing (17) with lockwasher (23) and machine screw (24).

(3) Connect, but do not solder, the resolver wires to terminal board TB4 (22) in the following order:

- (*a*) Connect the blue wire to terminal 1.
- (*b*) Connect the orange wire to terminal 2.
- (*c*) Connect the resolver ground wire to terminal 3.
- (*d*) Connect the black wire to terminal 4.
- (*e*) Connect the red wire to terminal 5.

(4) Slide resolver gear (13) on the shaft of resolver B1 (21) with the hub on resolver gear (13) toward the body of resolver B1 (21).

(5) Tighten two setscrews (14 and 15). These two setscrews are accessible through a hole in the smaller rim of resolver housing (17).

(6) Slide idler gear (16) onto its pin on resolver housing (17), and mesh with resolver gear (13).

(7) Place dial (12) in resolver housing (17) with the notch in dial (12) around a pin protruding from resolver housing (17).

(8) Secure dial (12) in place by placing dial retainer (10) inside rim of resolver housing (17).

(9) Place hub on needle (11) through center hole in dial (12).

(10) Slide hub on needle (11) on shaft of resolver B1 (21) until end of shaft is flush with front side of needle (11).

(11) If dial window (9) has been removed from front cover (5), replace it now by placing window seal (8) around dial window (9). Then carefully push dial window (9) into front cover (5).

(12) Slide shaft sleeve (6) into shaft hole in front cover (5).

(13) Lubricate inside of shaft sleeve (6) with Dow Corning stopcock grease.

(14) Insert shaft of drive gear (7) into shaft sleeve (6) from rear of front cover (5).

(15) From front of front cover (5), slide spring washer (4) over shaft of drive gear (7).

(16) Slide knob (1) over shaft of drive gear (7).

(17) Slightly squeeze knob (1) and drive gear (7) together, and tighten two setscrews (2 and 3).

(18) Place front cover (5) over resolver housing (17), oriented so drive gear (7) meshes with idler gear (16).

(19) Place gasket (25) on rear side of front cover (5). Align holes in gasket (25) with holes on rear side of front cover (5).

(20) Place rear housing (26) on rear side of front cover (5) with pin protruding from rear housing (26) inserted in small hole on rear side of front cover (5).

(21) Secure rear housing (26) to front cover (5) with eight machine screws (28) and eight lockwashers (27).

(22) Adjust LOOP SIMULATOR (para 3-15).

b. Replacement.

(1) Bring the two shielded, twisted pair of leads out to the front of the test set front panel through the LOOP SIMULATOR hole.

(2) Solder the two twisted pairs of wire and the two shields to the terminals on terminal board TB4 on the rear side of the LOOP SIMULATOR. The correct connections are determined by the wire labeling performed during removal of the LOOP SIMULATOR.

(3) Solder the yellow lead of resolver B1 to terminal 1 of TB1 and the green lead to terminal 1 of TB2.

(4) Place the LOOP SIMULATOR in the test set front panel, and secure with the three screws and three nuts.

(5) Replace the cover that shields the converter circuit (fig. 2-2).

(6) Replace the test set front panel (para 3-12).

3-11. Reassembly and Replacement of the BEARING INDICATOR

a. Reassembly (fig. 3-2).

(1) Mount synchro B2 (1) on the rear of synchro housing (5) and secure with three synchro clamps (4), three lockwashers (3), and three machine screws (2).

(2) Place dial (6) in synchro housing (5) with the notch in dial (6) around a pin protruding from synchro housing (5).

(3) Secure dial (6) in place by placing dial retainer (8) inside the rim of synchro housing (5).

(4) Place the hub on needle (7) through the center hole in dial (6).

(5) Slide the hub on needle (7) onto the shaft of synchro B2 (1) until the end of the shaft is flush with the front side of needle (7).

(6) Push the wires of synchro B2 (1) through the front of rear housing (16) and out the connector hole at the rear of rear housing (16).

(7) Place connector gasket (15) around the wires of synchro B2 (1).

(8) Solder the wires of synchro B2 (1) to connector J1 (14). The correct connections are determined by the wire labeling performed during disassembly of the BEARING INDICATOR.

(9) Mount connector J1 (14) on rear housing (16) with connector gasket (15) between connector J1 (14) and rear housing (16).

(10) Adjust the BEARING INDICATOR (para 3-17).

(11) If dial window (9) has been removed from front cover (11), replace it now by replacing window seal (10) inside front cover (11). Then carefully push dial window (9) into window seal (10).

(12) Place synchro B2 (1) inside rear housing (16), and set synchro housing (5) on the front of rear housing (16). Be sure the pin protruding from the front of rear housing (16) is in the hole in synchro housing (5).

(13) Place cover gasket (20) on the front of rear housing (16), and align the holes in cover gasket (20) with the holes in rearing housing (16).

(14) Mount front cover (11) over synchro housing (5) and secure to the front of rear housing (16) with eight machine screws (18) and eight lockwashers (19).

b. Replacement.

(1) Bring connector P3 out to the front of the test set front panel through the hole marked BEARING INDICATOR.

(2) Connect P3 to the connector on the rear of the BEARING INDICATOR.

(3) Place the BEARING INDICATOR in the test set front panel and secure with the four screws and four nuts.

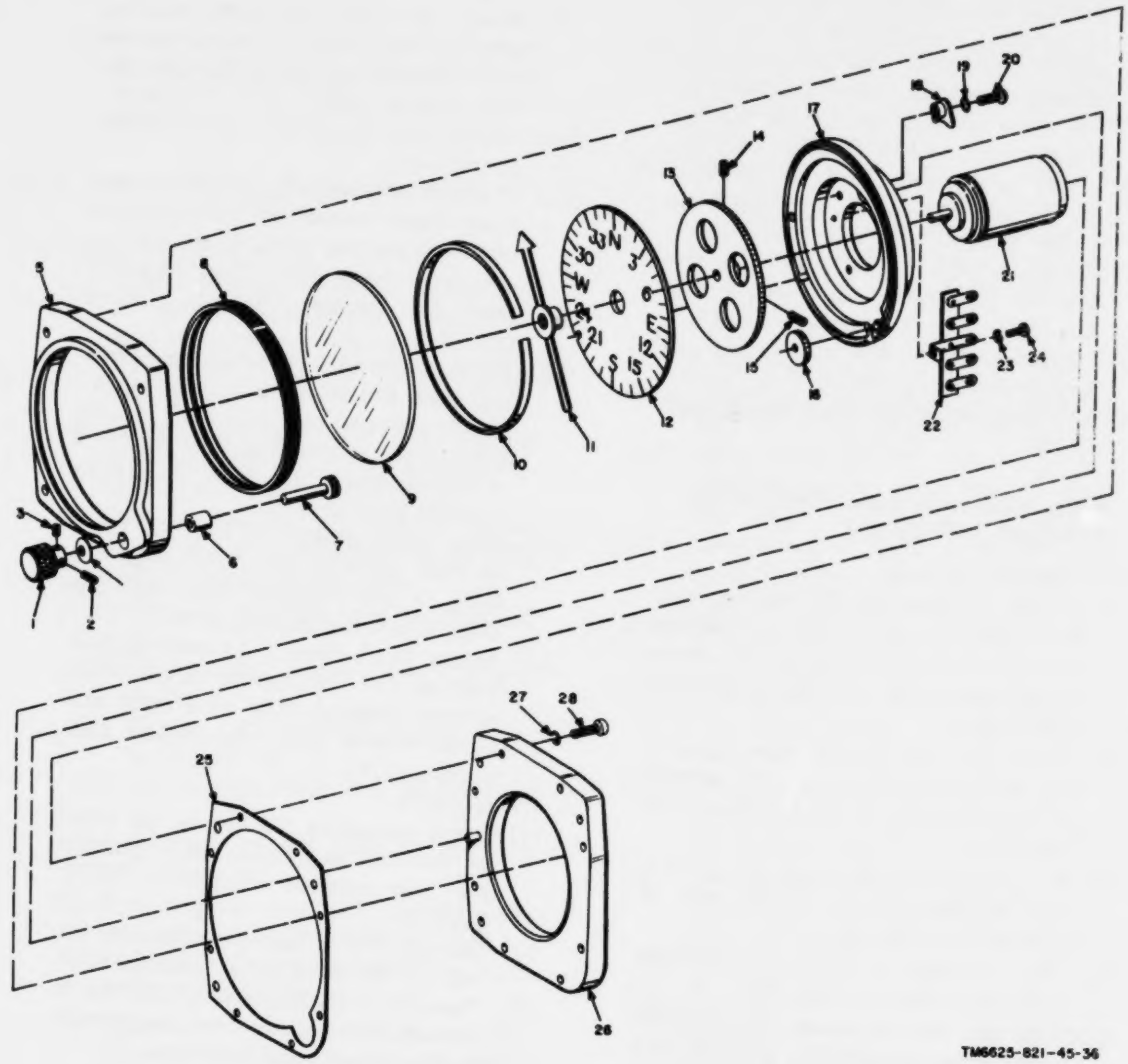
(4) Replace the test set front panel (para 3-12).

3-12. Replacement of Test Set Front Panel

a. Replace the LOOP SIMULATOR and BEARING INDICATOR (para 3-10 and 3-11).

b. Be sure the connector on the power cable is connected to J7 in the test set.

c. Place the front cover on the frame of the test set and secure with the 12 screws.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
33
N
3
30
W
6
24
E
21
12
S
15
TM6625-821-45-36

1	Knob, 03
2	Setscrew, No. 2
3	Setscrew, No. 2
4	Washer, spring
5	Cover, front
6	Sleeve, shaft
7	Gear, drive
8	Seal, window
9	Window, dial
10	Retainer, dial
11	Needle
12	Dial
13	Gear, resolver
14	Setscrew No. 2
15	Setscrew, No. 2
16	Gear, idler
17	Housing, resolver
18	Clamp, resolver
19	Lockwasher
20	Screw, machine, No. 4, 5/16 in. long
21	Resolver B1
22	Board, terminal, TB4
23	Lockwasher
24	Screw, machine, No. 4, 5/16 in. long
25	Gasket
26	Housing, rear
27	Lockwasher
28	Screw, machine, No. 2, 5/16 in. long

Figure 3-1. LOOP SIMULATOR, exploded view.

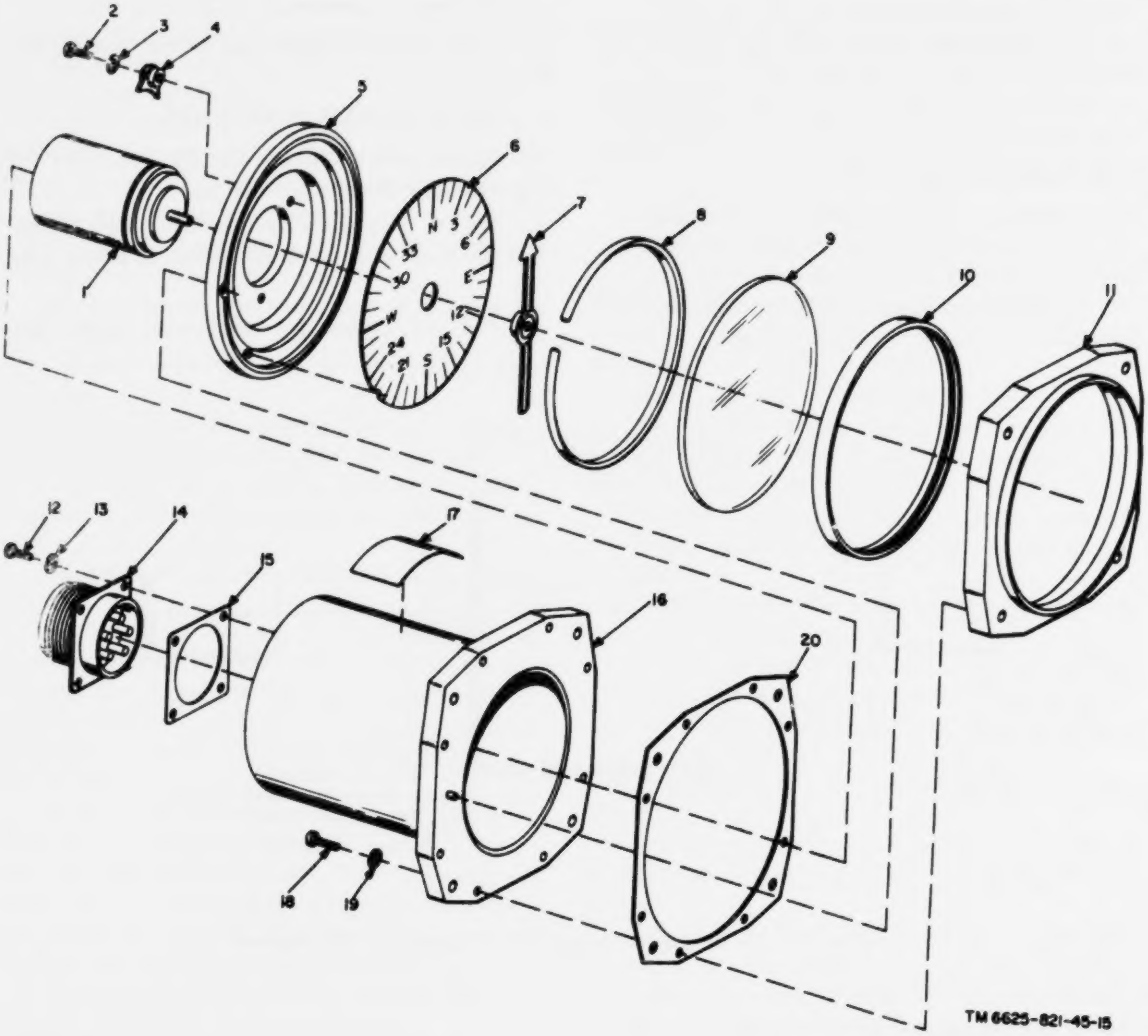

1
2
3
4
5
6
N
3
6
E
12
15
S
21
24
W
30
33
7
8
9
10
11
12
13
14
15
16
17
18
19
20
TM 6625-821-45-15

Figure 3-2. BEARING INDICATOR, exploded view.

Section II. ALIGNMENT

3-13. Test Equipment and Additional Equipment Required for Alignment

a. Test Equipment. Following is a list of the test equipment required to perform the alignment procedures. The common name of the test equipment is used throughout the alignment procedures.

Nomenclature	*Common name*
Multimeter ME-26(*)/U	Multimeter.
Voltmeter, Meter ME-30A/U or Voltmeter, Electronic ME-30(*)/U.	Voltmeter.
Q-Meter TS-617(*)/U	Q-Meter.
Signal Generator AN/GRM-50	Signal generator.
Oscilloscope AN/USM-140A (TM 11-6625-535-15).	Oscilloscope.

b. Additional Equipment.

(1) Fabricated cable used to adjust the BEARING INDICATOR (fig. 3-5).

(2) Fabricated cable used to adjust the output impedance of the LOOP SIMULATOR (fig. 4-1).

3-14. Inverter Load Adjust

a. Remove the test set front panel (para 3-7).

b. Set the switches on the test set as follows:

(1) DC POWER switch to OFF.

(2) RECEIVER-CONTROL switch to CONTROL.

(3) Function switch to ADF.

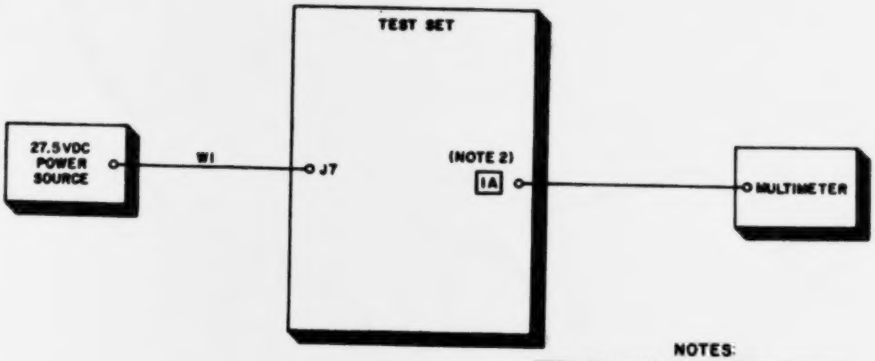
(4) All other switches may be set to any position.

c. Set DC POWER switch to ON.

d. Adjust potentiometer R11 (fig. 2-2) until the multimeter indicates 26 volts ac.

e. Set DC POWER switch to OFF, and disconnect the test set from the 27.5-volt dc power supply.

f. Replace the test set front panel (para 3-12).



NOTES:
1. ▭ INDICATES EQUIPMENT MARKINGS.
2. TEST POINT PROVIDED IN CENTER OF FUSECAP.

TM6625-821-45-C2-3

Figure 3-3. Test connections for inverter load adjustment, block diagram.

3-15. Alignment of LOOP SIMULATOR

a. Disconnect the test set from the 27.5-volt dc power supply.

b. Remove the LOOP SIMULATOR (para. 3-5*a*).

c. Refer to figure 4-9, and connect the LOOP SIMULATOR, signal generator, oscilloscope, and voltmeter as follows:

(1) Connect the signal generator RF OUTPUT between the green and yellow leads of LOOP SIMULATOR resolver B1. The hot lead of the signal generator must be connected to the green lead.

(2) Connect the horizontal input of the oscilloscope across the RF OUTPUT of the signal generator.

(3) Connect the vertical input of the oscilloscope between the blue and orange leads of resolver B1. The hot lead to the vertical input must be connected to the blue lead of resolver B1.

(4) Connect the voltmeter across the vertical input of the oscilloscope.

d. Adjust the equipment as follows:

(1) Adjust the signal generator to 100 kc, unmodulated, at an output level of 3 volts ac.

(2) Adjust the oscilloscope for external horizontal sweep operation.

(3) Set the vertical polarity of the oscilloscope to + up.

e. Set the LOOP SIMULATOR needle to N with the LOOP simulator control.

f. Loosen the three resolver clamps that hold resolver B1 to the resolver housing.

g. Rotate the entire resolver until a null is indicated on the voltmeter.

h. A 360° rotation of resolver B1 will produce two nulls 180° from each other. To determine which is the correct null, perform the following procedure:

(1) As viewed from the rear of the LOOP SIMULATOR, rotate resolver B1 approximately 5° clockwise from the null position.

(2) Disconnect the horizontal lead from the oscilloscope, and adjust the vertical gain for a 4-centimeter vertical trace, centered on the vertical axes.

(3) Reconnect the horizontal lead, and disconnect the vertical lead from the oscilloscope.

(4) Adjust the horizontal gain of the oscilloscope for a 4-centimeter horizontal trace, centered on the horizontal axes.

(5) Reconnect the vertical lead to the oscilloscope.

(6) A 1-to-1 Lissajous pattern should be observed on the oscilloscope. If the top of the pattern is tilted into the upper right-hand quadrant, the null obtained in *g* above was the correct null. Readjust resolver B1 for the null obtained in *g* above and proceed to *i* below.

(7) If the top of the 1-to-1 Lissajous pattern is tilted into the upper left-hand quadrant, rotate resolver B1 approximately 175° clockwise as viewed from the rear of the LOOP SIMULATOR and adjust for another null indication on the voltmeter. Proceed to step *i* below.

i. Tighten the three resolver clamps that hold resolver B1 to the resolver housing.

j. Disconnect all the test equipment, and replace the LOOP SIMULATOR (para 3-10*b*).

3-16. LOOP SIMULATOR Impedance Adjustment

a. Align the LOOP SIMULATOR (para 3-15).

b. Remove the test set front panel (para 3-7).

c. Connect the equipment as shown in figure 4-10. A detailed drawing of the fabricated cable is shown in figure 4-1.

d. Adjust the Q-meter as follows:

(1) Set the POWER ON switch to ON.

(2) Set the range switch to the 450-1500 KC position.

(3) Set the FREQUENCY control to 650 kc.

(4) Set the LEVEL-Q switch to LEVEL, and rotate the ZERO ADJ LEVEL control until the CIRCUIT Q voltmeter reading is 0.

(5) The LEVEL-Q switch to Q, and rotate the ZERO ADJ Q control until the CIRCUIT Q voltmeter reading is 0.

(6) Set the LEVEL-Q switch to LEVEL.

(7) Set the RF ON switch to ON.

(8) Adjust the SET LEVEL FINE and the SET LEVEL COARSE controls until the CIRCUIT Q voltmeter pointer is over the redline on the meter.

(9) Set the LEVEL-Q switch to Q.

(10) Set the vernier inductance control to 0.

(11) Set the MICRO MICRO FARADS INDUCTANCE control to 200 micro-microfarads.

(12) Set the Q RANGE switch to positions required to keep the CIRCUIT Q voltmeter within its range.

e. Adjust the LOOP SIMULATOR on the test set so the needle points to N.

f. Adjust variable inductor L3 in the test set (fig. 2-2) for a maximum Q-indication on the Q-meter. The maximum Q-indication must be greater than 20.

g. Disconnect the fabricated cable from the Q-meter.

h. Using the fabricated cable, connect pins F and H of cable W3 to the COIL terminals of the Q-meter.

i. Adjust the LOOP SIMULATOR on the test set so the needle points to E.

j. Adjust variable inductor L8 in the test set (fig. 2-2) for a maximum Q-indication on the Q-meter. The maximum Q-indication must be greater than 20.

k. Disconnect the equipment, and replace the test set front panel (para 3-12).

3-17. Adjustment of BEARING INDICATOR

a. Remove the BEARING INDICATOR (para 3-6*a*).

b. Remove the control unit (para 3-4*a*).

c. Remove the front cover from the BEARING INDICATOR by removing the eight screws and lockwashers located around the perimeter and on the rear side of the rear housing.

d. Set the control on the test set as follows:

(1) Set the DC POWER switch to OFF.

(2) Set the RECEIVER-CONTROL switch to CONTROL.

(3) All other switches may be set to any position.

e. Refer to figure 3-4, and connect the equipment as follows:

(1) Connect the fabricated cable to the connector at the rear of the BEARING INDICATOR. A detailed drawing of the fabricated cable is shown in figure 3-5.

(2) Connect the wire from pin A of the connector on the fabricated cable to pin M of connector P1 on the test set.

(3) Connect one of the wires from pin B of the connector on the fabricated cable to pin H of connector P1 on the test set.

(4) Connect the wires from pins C and D of the connector on the fabricated cable to the INPUT of the voltmeter.

(5) Connect wire from pin E of the connector of the fabricated cable to the test set connector pin P1-E.

f. Set the DC POWER switch to ON.

g. Manually rotate the BEARING INDICATOR needle for a null indication on the voltmeter.

NOTE

A 360° rotation of the BEARING INDICATOR needle will produce two nulls 180° from each other. To determine which is the correct null, measure the ac voltage between the wires from pins B and D of the connector on the fabricated cable. This ac voltage will be less than 26 volts ac when the BEARING INDICATOR needle is set to the correct null.

h. With BEARING INDICATOR needle set to the correct null, perform the following procedure to zero the BEARING INDICATOR needle.

(1) Loosen the three synchro clamps that hold synchro B2 to the synchro housing.

(2) Rotate the entire synchro until the BEARING INDICATOR needle points to N.

(3) Tighten the three synchro clamps that hold synchro B2 to the synchro housing.

(4) Set the DC POWER switch to OFF.

i. Replace the front cover on the BEARING INDICATOR and secure with the eight screws and lockwashers.

j. Disconnect the fabricated cable from the BEARING INDICATOR, and replace the BEARING INDICATOR in the test set (para 3-11*b*).

k. Replace the control unit in the test set (para 3-9*b*).

3-18. Adjustment of Inverter

Adjustment procedures for the inverter are contained in TM 11-5826-225-35 for Direction Finder Set AN/ARN-83.

3-19. Adjustment of Control Unit

All adjustment procedures for the control unit are contained in TM 11-5826-225-35 for Direction Finder Set AN/ARN-83.

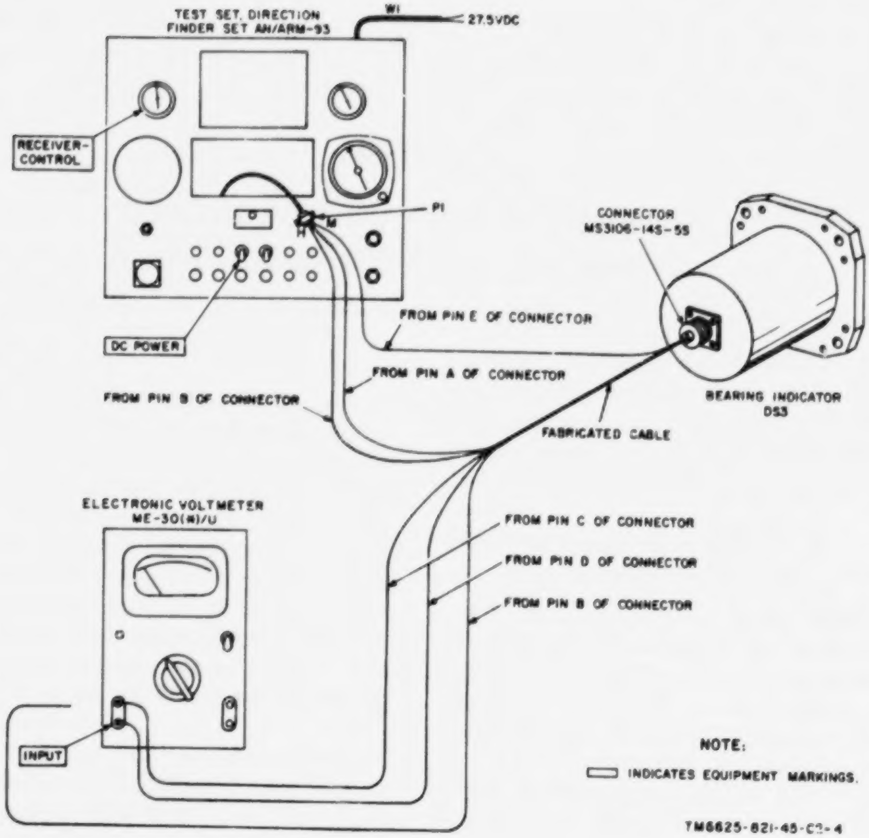

TEST SET, DIRECTION FINDER SET AN/ARM-93
W1
27.5VDC
RECEIVER-CONTROL
P1
H
M
DC POWER
CONNECTOR MS3106-14S-5S
FROM PIN E OF CONNECTOR
FROM PIN A OF CONNECTOR
FROM PIN B OF CONNECTOR
BEARING INDICATOR DS3
FABRICATED CABLE
ELECTRONIC VOLTMETER ME-30(*)/U
FROM PIN C OF CONNECTOR
FROM PIN D OF CONNECTOR
FROM PIN B OF CONNECTOR
INPUT
NOTE:
▭ INDICATES EQUIPMENT MARKINGS.
TM6625-821-45-C2-4

Figure 3-4. Test connections for BEARING INDICATOR adjustment.

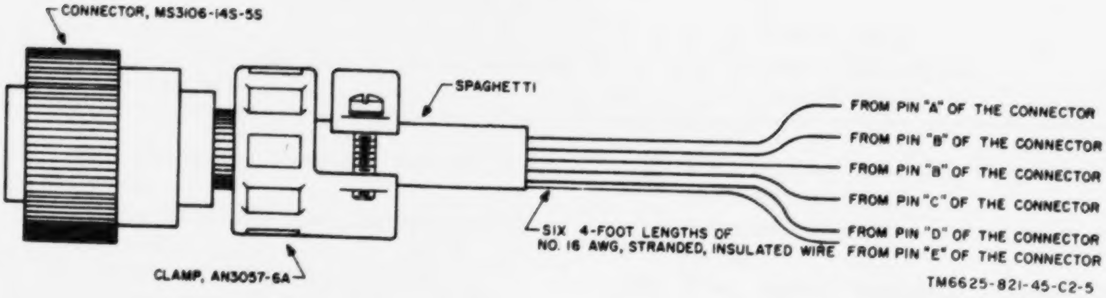

CONNECTOR, MS3106-14S-5S
SPAGHETTI
FROM PIN "A" OF THE CONNECTOR
FROM PIN "B" OF THE CONNECTOR
FROM PIN "B" OF THE CONNECTOR
FROM PIN "C" OF THE CONNECTOR
FROM PIN "D" OF THE CONNECTOR
FROM PIN "E" OF THE CONNECTOR
SIX 4-FOOT LENGTHS OF NO. 16 AWG, STRANDED, INSULATED WIRE
CLAMP, AN3057-6A
TM6625-821-45-C2-5

Figure 3-5. Fabricated cable for the BEARING INDICATOR, construction details.

CHAPTER 4

GENERAL SUPPORT TESTING PROCEDURES AND DEPOT OVERHAUL STANDARDS

4-1. General

a. Test procedures are prepared for use by personnel responsible for general support and depot maintenance of electronics equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that repaired equipment *must* meet before it is returned to the using organization. The test procedures are *both* general support testing procedures and depot Overhaul standards. A summary of the general support test procedures and depot overhaul standards is given in paragraph 4-19.

b. Comply with the instructions preceeding the body of each chart before proceeding to the chart. Perform each test in sequence. Do not vary the sequence. For each step, perform all the actions required in the *Control Settings*, columns; then perform each specific test procedure and verify it against its performance standards.

4-2. Test Equipment, Tools, and Materials Required

All test equipment, tools, materials, and other equipment required to perform the test procedures given in this section are listed in the following chart and are authorized under TA 11-17, Signal Fiels Maintenance Shops, and TA 11-100 (11-17), Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shop, Continental United States.

a. Test Equipment.

Nomenclature	Common name	Technical manual
Multimeter ME-26(*)/U	Multimeter	TM 11-6625-200-12.
Voltmeter, Meter ME-30A/U or Voltmeters, Electronic ME-30 (*)/U.	Voltmeter	TM 11-6625-320-12.
Q Meter TS-617(*)/U	Q-Meter	TM 11-2635A.
Signal Generator AN/GRM-50	Signal generator	TM 11-6625-573-15.
Oscilloscope AN/USM-140A	Oscilloscope	TM 11-6625-535-15.

b. Tools. No special tools are required.

c. Materials.

(1) Capacitor, 1,800 micromicrofarad ±1 percent.
(2) Connector, MS3106A-14S-5S.
(3) Clamp, AN3057-6A.
(4) Connector, Bendix PT02A-12-10P (two required).
(5) Wire, copper, insulated, solid, 20 AWG (1 foot long).
(6) Wire, copper, insulated, stranded, 16 AWG (20 feet long).
(7) Inductor, 22 microhenrys (three required).
(8) Wire, copper, insulated, stranded, 22 AWG (1 foot long).
(9) BNC connector (UG910B/U).

d. Other Equipment.

(1) Fabricated cable for LOOP SIMULATOR (para 4-4*a*).

(2) Fabricated cable for sense antenna adapter (para 4-4*b*).
(3) Test jig for LOOP SIMULATOR (para 4-4*c*).

4-3. Test Facilities

A dc power source of +27.5 volts dc capable of supplying a current of 3 amperes is required to furnish the operating voltages for Test Set, Direction Finder Set AN/ARM-93. The negative side of the power source should be grounded. If a battery eliminator is used, the peak ac ripple voltage should not exceed 1.4 volts root mean square (rms). Unless otherwise specified, all test procedures should be performed with the inverter and the control unit installed in the test set.

4-4. Fabricated Equipment

a. Fabricate a cable for the LOOP SIMULATOR in accordance with the details in figure 4-1. This cable is required to connect the LOOP SIMULATOR circuit in the test set to the Q-meter.

b. Fabricate a cable for the sense antenna adapter in accordance with the details in figure 4-2. This cable is required to connect the sense antenna adapter to the Q-meter.

c. Fabricate a test jig for the LOOP SIMULATOR in accordance with the details in figure 4-3. This test jig is required to apply a load to the LOOP SIMULATOR output when measuring its output signal.

4-5. Modification Work Orders

The performance standards listed in the tests (para 4-6 through 4-18) assume that the modification work orders, if any, have been performed. A listing of current modification work orders will be found in DA Pam 310-4.

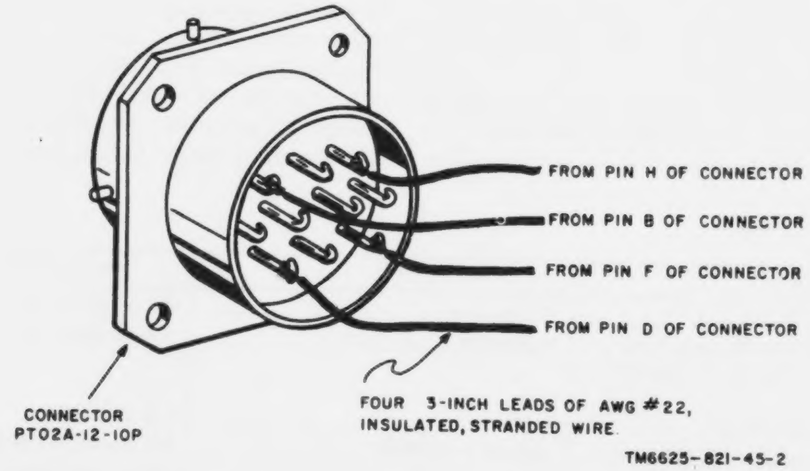

FROM PIN H OF CONNECTOR
FROM PIN B OF CONNECTOR
FROM PIN F OF CONNECTOR
FROM PIN D OF CONNECTOR
CONNECTOR PT02A-12-10P
FOUR 3-INCH LEADS OF AWG #22, INSULATED, STRANDED WIRE.
TM6625-821-45-2

Figure 4-1. Fabricated cable for LOOP SIMULATOR, construction details.

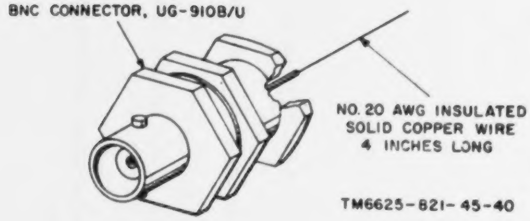

BNC CONNECTOR, UG-910B/U
NO. 20 AWG INSULATED SOLID COPPER WIRE 4 INCHES LONG
TM6625-821-45-40

Figure 4-2. Fabricated cable for the sense antenna adapter, construction details.

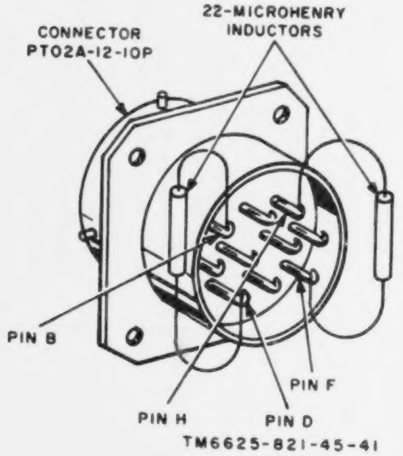

22-MICROHENRY INDUCTORS
CONNECTOR PT02A-12-10P
PIN B
PIN F
PIN H
PIN D
TM6625-821-45-41

Figure 4-3. Test jig for the LOOP SIMULATOR, construction details.

4-6. Inverter, Power, Static CV-2128/ARN-83 Physical Tests and Inspection

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. Remove the inverter from the test set, and remove the cover from the inverter.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	NA	NA	*a.* Inspect for loose or missing screws, bolts, or nuts. *b.* Inspect insulation of wiring for cuts, pinches, and signs of burning. *c.* Check to see that nuts on top of transistors are tight and none are missing. *d.* Inspect mica insulating washers between transistors and chassis for cracks. *e.* Check resistors for cracks and signs of burning. *f.* Inspect all insulated terminal studs for looseness and signs of damage. *g.* Inspect connector for bent pins and cracked insulation material. *h.* Inspect soldered connections for cold-soldered connections.	*a.* Screws, bolts, and nuts will be tight; none missing. *b.* No cuts, pinches, or signs of burning evident. *c.* Nuts should be tight; none missing. *d.* No cracks evident. *e.* No signs of cracks or burning evident. *f.* No looseness or damage evident. *g.* No bent pins or cracked insulation evident. *h.* No cold-soldered connections evident.
2	NA	NA	Check inverter for applicable modification work orders (para 4-5).	None.

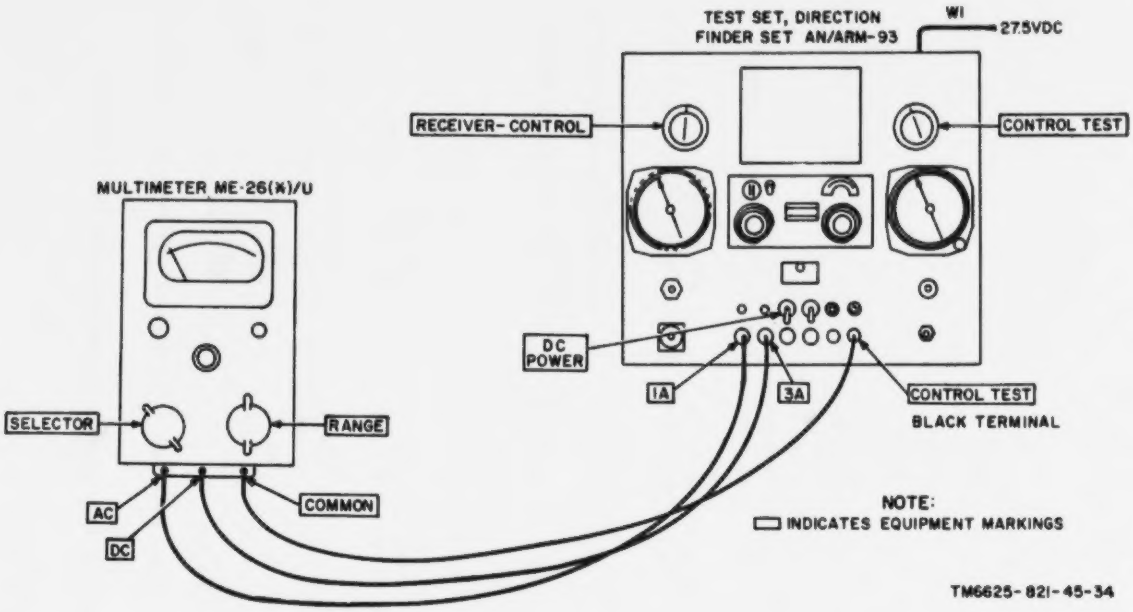

TEST SET, DIRECTION
FINDER SET AN/ARM-93
W1
27.5VDC
RECEIVER- CONTROL
CONTROL TEST
MULTIMETER ME-26(*)/U
DC POWER
1A
3A
CONTROL TEST
BLACK TERMINAL
SELECTOR
RANGE
AC
DC
COMMON
NOTE:
INDICATES EQUIPMENT MARKINGS
TM6625-821-45-34

Figure 4-4. Inverter test.

4–7. Inverter Test

a. Test Equipment and Materials. Multimeter ME–26(*)/U is required for the following test.

b. Test Connections and Conditions. Connect the test equipment as shown in figure 4–4. The inverter can be installed directly in the test set, or connected by means of cable W4 (part ofthe test set.).

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*ME–26(*)/U* SELECTOR: ± RANGE: as required.	AN/ARM–93 DC POWER: ON RECEIVER-CONTROL: CONTROL CONTROL TEST: 1	*a.* Insert the DC probe of the ME–26(*)/U into the center of the 3A fuse cap. *b.* Set the SELECTOR switch on the ME–26(*)/U to AC. Insert the AC probe of the ME–26(*)/U into the center of the 1A fuse cap.	*a.* The voltage should be 27.5 volts dc ±0.5. *b.* The voltage should be 26 volts ac ±0.5.

4–8. Control, Direction Finder C–6899/ARN–83 Physical Tests and Inspection

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. Remove the control unit from the test set, and remove the rear cover from the control unit.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	NA ----------------------	Controls may be in any position.	*a.* Inspect all controls and mechanical assemblies for loose or missing screws, bolts or nuts. *b.* Inspect dial lights and rear connector for looseness and damage. *c.* Inspect tuning meter face for scratches or broken glass. *d.* Inspect case and chassis for damage, missing parts, and condition of finish. *e.* Inspect condition of finish and lettering on front panel.	*a.* Screws, bolts, and nuts will be tight; none missing. *b.* No looseness or damage evident. *c.* No scratches or broken glass evident. *d.* No damage or missing parts evident. *e.* External surfaces intended to be painted will not bare metal. Panel lettering will be legible.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
			Note. Touchup painting is recommended instead of refinishing whenever practicable. Screwheads, binding posts, connectors, and plated fastener parts will not be painted or polished with abrasives.	
2	NA	Controls may be in any position.	*a.* Turn LOOP switch to first position R (right) or L (left) and release knob.	*a.* Operates freely without binding or excessive looseness; spring returns to center position. Switch should have positive detent action.
			b. Turn LOOP switch to second position R (right) or L (left) and release knob.	*b.* Same as *a* above. Switch stops should be encountered at extreme right and left positions.
			c. Set BFO-OFF switch to BFO and OFF positions.	*c.* Operates freely to BFO and OFF.
			d. Rotate function switch to ADF, ANT, and LOOP positions and back to OFF.	*d.* Operates freely without binding and rubbing against panel or excessive looseness. Switch will have positive detent action.
			e. Rotate range switch to all frequency range positions.	*e.* Same as *d* above.
			f. Rotate GAIN and TUNE controls throughout their limits of travel.	*f.* Controls rotate freely without binding or excessive looseness.
3	NA	NA	Check control unit for applicable modification works orders (para 4-5).	None.

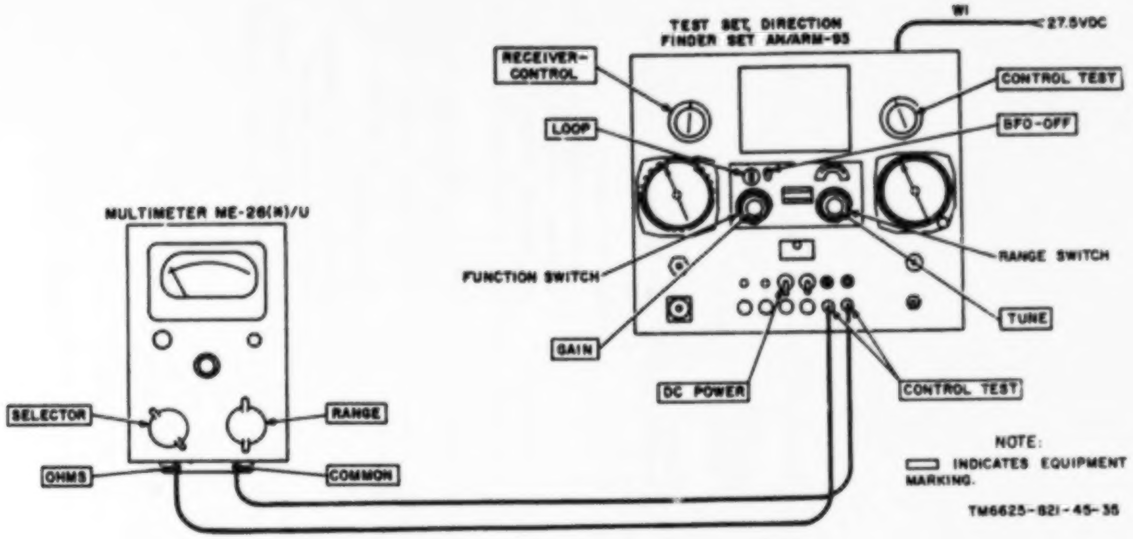

TEST SET, DIRECTION FINDER SET AN/ARN-93
W1
27.5VDC
RECEIVER-CONTROL
CONTROL TEST
LOOP
BFO-OFF
MULTIMETER ME-26(*)/U
RANGE SWITCH
FUNCTION SWITCH
TUNE
GAIN
DC POWER
CONTROL TEST
SELECTOR
RANGE
OHMS
COMMON
NOTE:
INDICATES EQUIPMENT MARKING.
TM6625-821-45-35

Figure 4-5. Control unit test setup.

Charts Transposed to
End of Volume.

4-10. Test Fixture, Loop Antenna MT-3667/ARM-93 Physical Tests and Inspection

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. Remove the fiberboard bottom from the loop test fixture.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	NA	NA	*a.* Inspect for loose or missing screws, nuts, or bolts. *b.* Inspect insulation of wiring for cuts or pinches. *c.* Check to see that nuts securing banana plugs to fiberboard are tight and none missing. *d.* Inspect the multipin connector for bent pins and cracked insulation material. *e.* Inspect soldered connections for cold-soldered connections. *f.* Set the switch to position 1 and 2.	*a.* Screws, nuts, and bolts will be tight; none missing. *b.* No cuts or pinches evident. *c.* Nut will be tight; none missing. *d.* No bent pins or cracked insulation evident. *e.* No cold-soldered connections evident. *f.* The switch operates freely between positions 1 and 2.
2	NA	NA	Check loop test fixture for applicable modification work orders (para 4-5).	None.

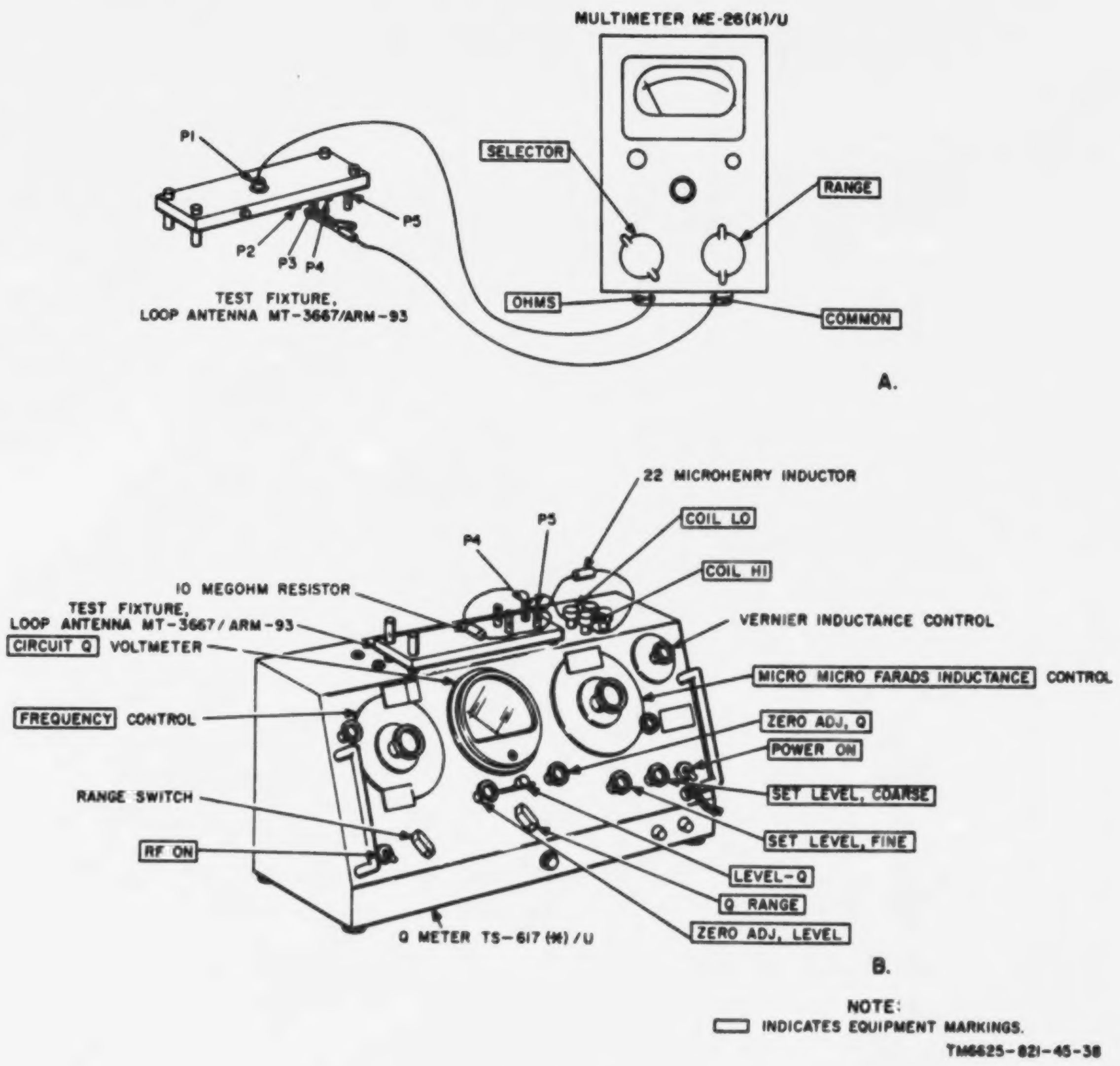

MULTIMETER ME-26(*)/U
P1
P2
P3
P4
P5
SELECTOR
RANGE
OHMS
COMMON
TEST FIXTURE,
LOOP ANTENNA MT-3667/ARM-93
A.
22 MICROHENRY INDUCTOR
COIL LO
COIL HI
P4
P5
10 MEGOHM RESISTOR
TEST FIXTURE,
LOOP ANTENNA MT-3667/ARM-93
CIRCUIT Q VOLTMETER
VERNIER INDUCTANCE CONTROL
MICRO MICRO FARADS INDUCTANCE CONTROL
FREQUENCY CONTROL
ZERO ADJ, Q
POWER ON
SET LEVEL, COARSE
SET LEVEL, FINE
RANGE SWITCH
RF ON
LEVEL-Q
Q RANGE
ZERO ADJ, LEVEL
Q METER TS-617(*)/U
B.
NOTE:
INDICATES EQUIPMENT MARKINGS.
TM6625-821-45-38

Figure 4-6. Loop test fixture test setup.

4–12. Simulator, Antenna SM–446/ARM–93 Physical Tests and Inspection

a. Test Equipment and Materials. None required.
b. Test Connections and Conditions. None.
c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	NA -------------------	NA ----------------------------	*a.* Inspect for loose or missing screws, nuts, or bolts. *b.* Inspect insulation of wiring for cuts and pinches. *c.* Inspect both connectors for cracked insulation material	*a.* Screws, nuts, and bolts will be tight; none missing. *b.* No cuts or pinches evident. *c.* No cracked insulation evident.

			d. Inspect soldered connections for cold-soldered connections. *e.* Set the switch to 150 PF and 270 PF.	*d.* No cold-soldered connections evident. *e.* The switch operates freely when switched between 150 PF and 270 PF.
2	NA	NA	Check sense antenna adapter for applicable modification work orders (para 4–5).	None.

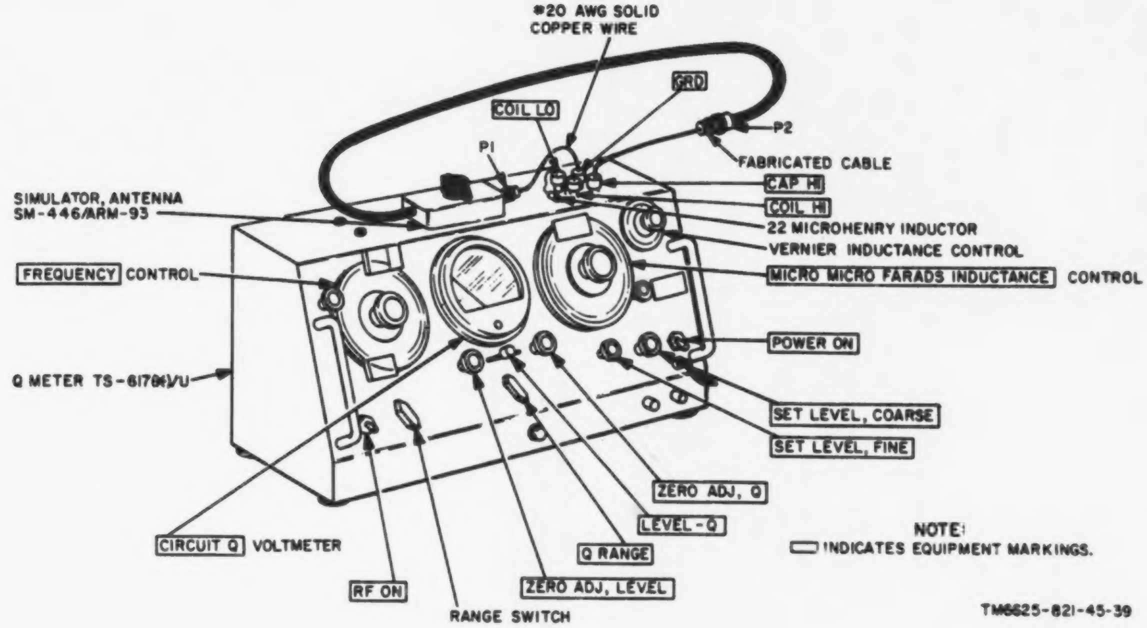

#20 AWG SOLID COPPER WIRE
GRD
COIL LO
P2
P1
FABRICATED CABLE
SIMULATOR, ANTENNA SM-446/ARM-93
CAP HI
COIL HI
22 MICROHENRY INDUCTOR
VERNIER INDUCTANCE CONTROL
FREQUENCY CONTROL
MICRO MICRO FARADS INDUCTANCE CONTROL
POWER ON
Q METER TS-617(*)/U
SET LEVEL, COARSE
SET LEVEL, FINE
ZERO ADJ, Q
LEVEL-Q
CIRCUIT Q VOLTMETER
Q RANGE
NOTE:
▭ INDICATES EQUIPMENT MARKINGS.
ZERO ADJ, LEVEL
RF ON
RANGE SWITCH
TM6625-821-45-39

Figure 4-7. Sense antenna adapter test setup.

4-13. Sense Antenna Adapter Test

a. Test Equipment and Materials.

(1) Q Meter TS-617(*)/U.

(2) Fabricated cable for sense antenna adapter.

b. Test Connections and Conditions. Replace the rear plate of the sense antenna adapter. Connect the equipment as shown in figure 4-7. Connect pin C of P1 to TS-617(*)/U with a short piece of #20 AWG solid copper wire. Set POWER ON switch on TS-617(*)/U to ON, and allow a 5-minute warmup period.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*TS-617(*)/U* Set the range switch to the 1-5–4.5 MC position. Set the FREQUENCY control to 3 megacycles. Turn the LEVEL–Q switch to the Q LEVEL position and rotate the ZERO ADJ LEVEL control until the CIRCUIT Q voltmeter reading is zero. Turn the LEVEL-Q switch to the Q position and rotate the ZERO ADJ Q control until the CIRCUIT Q voltmeter reading is zero. Turn LEVEL-Q switch to the LEVEL position. Turn the RF ON switch to the ON position. Adjust the SET LEVEL FINE and SET LEVEL COARSE controls until the CIRCUIT Q voltmeter pointer is over the red line on the meter. It may be necessary to readjust these controls when changing frequency to maintain the meter pointer over the red line.	*SM-446/ARM-93* Set the switch on the sense antenna adapter to 150 UUF.	*a.* Adjust the MICRO MICRO FARADS INDUCTANCE control for a maximum indication on the CIRCUIT Q voltmeter.	*a.* A maximum indication should occur with the MICRO MICRO FARADS INDUCTANCE control set to approximately 40 micromicrofarads.
			b. Peak the CIRCUIT Q voltmeter indication with the vernier inductance control.	*b.* None.
			c. Note the capacitance indicated on the MICRO MICRO FARADS INDUCTANCE control and on the vernier inductance control. Record this capacitance as C1.	*c.* Approximately 40 micromicrofarads.
			d. Disconnect the sense antenna adapter from TS-617(*)/U and set the vernier inductance control to zero.	*d.* None.
			e. Adjust the MICRO MICRO FARADS INDUCTANCE control for a maximum indication on the CIRCUIT Q voltmeter.	*e.* A maximum indication should occur with the MICRO MICRO FARADS INDUCTANCE control set to approximately 125 micromicrofarads.
			f. Peak the CIRCUIT Q voltmeter indication with the vernier inductance control.	*f.* None.
			g. Note the capacitance indicated on the MICRO MICRO FARADS INDUCTANCE control and on the vernier inductance control. Record this capacitance as C2.	*g.* Approximately 125 micromicrofarads.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
	Set the Q RANGE switch to positions required to keep CIRCUIT Q voltmeter within its range. Set the vernier inductance control to zero.		*h.* Use the recorded values of C1 and C2 in the following formula to calculate the total capacitance (C t) in the sense antenna adapter: $C\,t = C_1 - C_2$	*h.* The value of C t will equal 82- 8 micromicrofarads.
2	*TS-617(*)/U* Same as step 1.	*SM-446/ARM-93* Set the switch on the sense antenna adapter to 270 UUF.	Reconnect the equipment as shown in figure 4-7. Connect pin C to P1 to TS-617(*)/U with a short piece of ( ) 20 AWG solid copper wire. Repeat procedure in step 1.	Same as step 1.

4-14. Test Set, Radio TS-2502/ARM-93 Physical Tests and Inspection

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. Remove the test set front panel.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	NA	Controls may be in any position.	*a* Inspect all controls for loose or missing screws bolts, or nuts.	*a.* Screws, bolts, and nuts will be tight; none missing.
			b. Inspect the face of each meter for scratches or broken glass.	*b.* No scratches or broken glass evident.
			c. Inspect insulation of wiring for cuts or pinches.	*c.* No cuts or pinches evident.
			d. Inspect all connectors for bent pins and cracked insulation material.	*d.* No bent pins or cracked insulation evident.
			e. Inspect case and chassis for damage, missing parts, and condition of finish. Inspect condition of finish and lettering on front panel.	*e.* No damage or missing part evident. External surfaces intended to be painted will not show bare metal. Panel lettering will be legible.
			f. Inspect terminal board for cracks.	*f.* No cracks should be evident.
2	NA	Controls may be in any position.	*a.* Set the RECEIVER-CONTROL switch to RECEIVER and then to CONTROL.	*a.* Switch operates freely without binding or excessive looseness. Switch should have positive detent action.
			b. Rotate the CONTROL TEST switch through its 13 positions.	*b.* Switch operates freely without binding or excessive looseness. Switch should have positive detent action.
			c. Set DC POWER switch to ON and then OFF positions.	*c.* Switch operates freely to both positions.
			d. Set GONIO DRIVE switch to ON and OFF positions.	*d.* Same as *c* above.
			e. Rotate the loop simulator control on the LOOP SIMULATOR.	*e.* Control operates freely without binding and rubbing against panel. Operates with no excessive looseness.
3	NA	NA	Check test set for applicable modification work orders (para 4-5).	None.

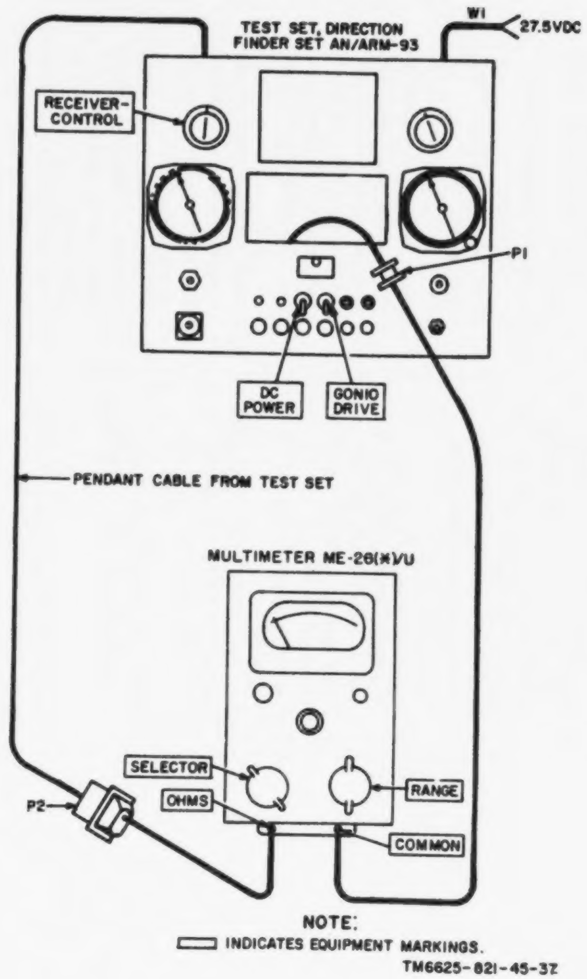

W1
27.5VDC
TEST SET, DIRECTION FINDER SET AN/ARM-93
RECEIVER-CONTROL
P1
DC POWER
GONIO DRIVE
PENDANT CABLE FROM TEST SET
MULTIMETER ME-26(*)/U
SELECTOR
OHMS
RANGE
P2
COMMON
NOTE:
INDICATES EQUIPMENT MARKINGS.
TM6625-821-45-37

Figure 4-8. Test set receiver circuitry test setup.

4-18. LOOP SIMULATOR Output Test

a. Test Equipment and Materials.

(1) Signal Generator AN/GRM-50.
(2) Voltmeter ME-30A/U.
(3) Test jig for the LOOP SIMULATOR.

b. Test Conditions and Connections. Connect the equipment as shown in figure 4-11. Throw the power switch on the AN/GRM-50 to ON and allow a 15-minute warmup period.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*AN/GRM-50* Set the RANGE selector to 165-560 KC. Adjust the FREQUENCY control and the VERNIER control until the output signal is 400 kc. Set the MODULATION SELECTOR to CW. Rotate the MODULATION AMPLITUDE control fully counterclockwise. Set the coarse ATTENUATOR to 3.0 volts. Adjust the VERNIER ATTENUATOR until the output meter indicates 3.0 volts.	*AN/ARM-93* The controls may be set to any position.	*a.* Adjust the LOOP SIMULATOR to indicate E. *b.* Connect ME-30A/U between pins F and H of the test jig, and adjust the LOOP SIMULATOR to indicate N.	*a.* ME-30A/U will indicate 3.2 to 3.9 millivolts ac. *b.* ME-30A/U will indicate 3.2 to 3.9 millivolts ac.
2	*AN/GRM-50* Set the RANGE selector to 530-1800 KC. Adjust the FREQUENCY control and the VERNIER control until the output signal is 850 kc. Adjust the VERNIER ATTENUATOR until the output meter indicates 3.0 volts.	*AN/ARM-93* The controls may be set to any position.	*a.* Leave ME-30A/U connected between pins F and H of the test jig, and adjust the LOOP SIMULATOR so it indicates N. *b.* Connect ME-30A/U between pins B and D of the test jig, and adjust the LOOP SIMULATOR so it indicates E.	*a.* ME-30A/U will indicate 7.2 to 8.9 millivolts ac. *b.* ME-30A/U will indicate 7.2 to 8.9 millivolts ac.

4-19. Summary of Test Data for General Support Testing Procedures and Depot Overhaul Standards

Personnel may find it convenient to arrange a checklist in a manner similar to that shown below:

1. INVERTER	27.5 volts dc ±0.5
DC probe of ME-26/U connected to 3A fuse cap.	
AC probe of ME-26/U connected to IA fuse cap.	26 volts ac ±0.5
2. CONTROL UNIT	
CONTROL TEST to 1.	
LOOP switch to center position.	0 ohm.
LOOP switch to second detent position right and then second detent position left.	0 ohm for both positions
LOOP switch to first position left or or right.	4,700 ±470 ohms.
CONTROL TEST to 2.	
BFO-OFF to BFO	0 ohm.
BFO-OFF to OFF	Infinity ohms.
CONTROL TEST to 3.	
Function switch to ADF.	0 ohm.
Function switch to ANT; slowly adjust GAIN control between extreme CCW and CW positions.	0 to 5,000 ±500 ohms.
Function switch to LOOP; adjust GAIN control as above.	470 ±47 to 5,470 ohms ±550.
CONTROL TEST to 4.	
Function switch to ADF.	5,000 ohms ±500.
Function switch to ANT.	5,000 ohms ±500.
Function switch to LOOP.	Approximately 5,500 ohms.
CONTROL TEST to 5.	
Function switch to ANT or LOOP.	0 ohm.
Function switch to ADF; slowly adjust GAIN control between extreme CCW and CW positions.	1,300 ±130 to 0 ohms.
CONTROL TEST to 6.	
Function switch to ADF; slowly adjust from extreme CCW to CW positions.	Approximately 680 ohms to infinity ohms.
Function switch to ANT.	Infinity ohms.
Function switch to LOOP.	Infinity ohms.
CONTROL TEST to 7.	
Function switch to OFF.	Infinity ohms.
Function switch to ADF.	0 ohm.
Function switch to ANT.	0 ohm.
Function switch to LOOP.	0 ohm.
CONTROL TEST to 8.	
Function switch to ADF.	Infinity ohms.
Function switch to ANT.	0 ohm.
Function switch to LOOP.	0 ohm.
CONTROL TEST to 9.	
Function switch to ADF.	0 ohm.
Function switch to ANT.	Infinity ohms.
Function switch to LOOP.	0 ohm.
CONTROL TEST to 10.	
Function switch to ADF.	0 ohm.
Function switch to ANT.	0 ohm.
Function switch to LOOP.	Infinity ohms.
CONTROL TEST to 11.	
Range switch to 190-400.	25 ohms ±2.
Range switch to 400-850.	0 ohm.
Range switch to 850-1750.	0 ohm.
CONTROL TEST to 12.	
Range switch to 190-400.	0 ohm.
Range switch to 400-850.	25 ohm ±2.
Range switch to 850-1750.	0 ohm.
CONTROL TEST to 13.	
Range switch to 190-400.	0 ohm.
Range switch to 400-850.	0 ohm.
Range switch to 850-1750.	25 ±2 ohms.
FREQUENCY indicator bisecting small circuit located between 1,400 and 1,500 kc.	239° ±1.0 on the BEARING INDICATOR.

FREQUENCY indicator at 1,700 kc.	203° ±1.0 on the BEARING INDICATOR.
FREQUENCY indicator at 850 kc.	343° ±1.0 on the BEARING INDICATOR.
Observation of the tuning meter.	Midscale.

3. LOOP TEST FIXTURE

ME-26/U connected between P3 and F of P1. Switch set to position 1.	0 ohm.
ME-26/U connected between P3 and B of P1. Switch set to position 1.	Infinity ohms.
ME-26/U connected between P3 and B of P1. Switch set to position 2.	0 ohm.
ME-26/U connected between P2 and D of P1. Switch set to position 2.	0 ohm.
ME-26/U connected P2 and D of P1. Switch set to position 1.	Infinity ohms.
ME-26/U connected between P2 and H of P1. Switch set to position 1.	0 ohm.
Q meter indication -------	1,000 ±10 micromicrofarads.

4. SENSE ANTENNA ADAPTER.

Switch set to 150 UUF.	82 ±8 micromicrofarads.
Switch set to 270 UUF.	82 ±8 micromicrofarads.

5. TEST SET RECEIVER CIRCUITRY.

ME-26/U connected between 8 of P2 and J of P1.	0 ohm.
ME-26/U connected between 9 of P2 and X of P1.	0 ohm.
ME-26/U connected between 10 of P2 and Y of P1.	0 ohm.
ME-26/U connected between 11 of P2 and Z of P1.	0 ohm.
ME-26/U connected between 12 of P2 and m of P1.	0 ohm.
ME-26/U connected between 13 of P2 and n of P1.	0 ohm.
ME-26/U connected between 14 of P2 and p of P1.	0 ohm.
ME-26/U connected between 15 of P2 and F of P1.	0 ohm.
ME-26/U connected between 16 of P2 and M of P1.	0 ohm.
ME-26/U connected between 17 of P2 and J of P1.	0 ohm.
ME-26/U connected between 18 of P2 and M of P1.	0 ohm.
ME-26/U connected between 22 of P2 and t of P1.	0 ohm.
ME-26/U connected between 23 of P2 and T of P1.	0 ohm.
ME-26/U connected between 24 of P2 and U of P1.	0 ohm.
ME-26/U connected between 35 of P2 and h of P1.	0 ohm.
ME-26/U connected between 36 of P2 and a of P1.	0 ohm.
DC POWER switch to ON.	AC and DC indicator lamps light.
DC POWER switch to OFF.	AC and DC indicator lamps will not light.

6. LOOP SIMULATOR RESOLVER.

LOOP SIMULATOR rotated toward N.	Null indication with LOOP SIMULATOR set to N.
LOOP SIMULATOR rotated 5° clockwise from N.	1:1 Lissajous pattern tilted into the upper right-hand quadrant.

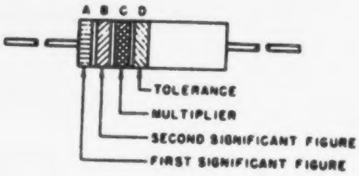
7. LOOP SIMULATOR IMPEDANCE.

Pins B and D of the LOOP SIMULATOR connected to the Q meter. LOOP SIMULATOR set to N.	Q not less than 20.

ME-26/U connected between 24 of P2 and V of P1.	0 ohm.
ME-26/U connected between 26 of P2 and c of P1.	0 ohm.
ME-26/U connected between 26 of P2 and L of P1.	0 ohm.
ME-26/U connected between 27 of P2 and k of P1.	0 ohm.
ME-26/U connected between 28 of P2 and j of P1.	0 ohm.
GONIO DRIVE switch set to OFF	Infinity ohms.
ME-26/U connected between 29 of P2 and i of P1.	0 ohm.
ME-26/U connected between 30 of P2 and q of P1.	0 ohm.
ME-26/U connected between 31 of P2 and r of P1.	0 ohm.
ME-26/U connected between 32 of P2 and s of P1.	0 ohm.
ME-26/U connected between 33 of P2 and f of P1.	0 ohm.
ME-26/U connected between 34 of P2 and g of P1.	0 ohm.
Pins F and H of the LOOP SIMULATOR connected to the Q meter. LOOP SIMULATOR set to E.	Q not less than 20.
8. LOOP SIMULATOR OUTPUT	
AN/GRM-50 set to 600 kc. ME-30A/U connected between pins B and D of cable W3. LOOP SIMULATOR set to E.	3.2 to 3.9 millivolts ac.
AN/GRM-50 set to 600 kc. ME-30A/U connected between pins F and H of cable W3. LOOP SIMULATOR set to N.	3.2 to 3.9 millivolts ac.
AN/GRM-50 set to 0.85 mc. ME-30A/U connected between pins F and H of W3. LOOP SIMULATOR set to N.	7.2 to 8.9 millivolts ac.
AN/GRM-50 set to 0.85 mc. ME-30A/U connected between pins B and D of W3. LOOP SIMULATOR set to E.	7.2 to 8.9 millivolts ac.

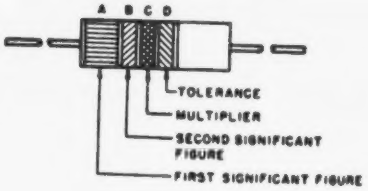
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS


A B C D
TOLERANCE
MULTIPLIER
SECOND SIGNIFICANT FIGURE
FIRST SIGNIFICANT FIGURE

BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS

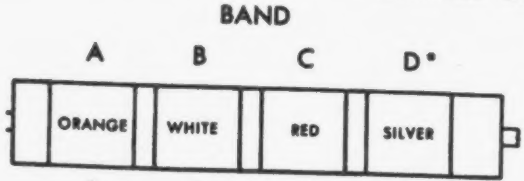

A B C D
TOLERANCE
MULTIPLIER
SECOND SIGNIFICANT FIGURE
FIRST SIGNIFICANT FIGURE

BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

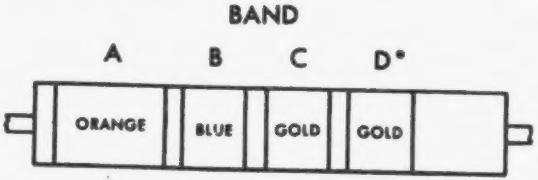
EXAMPLES OF COLOR CODING


BAND
A
B
C
D*
ORANGE
WHITE
RED
SILVER

3 9 X100 ± 10%

NOMINAL RESISTANCE 3,900 Ohms

RESISTANCE TOLERANCE ± 10 percent


BAND
A
B
C
D*
ORANGE
BLUE
GOLD
GOLD

3 6 X0.1 ± 5%

3.6 Ohms

± 5 percent

*If Band D is omitted, the resistor tolerance is ± 20%, and the resistor is not Mil-Std.

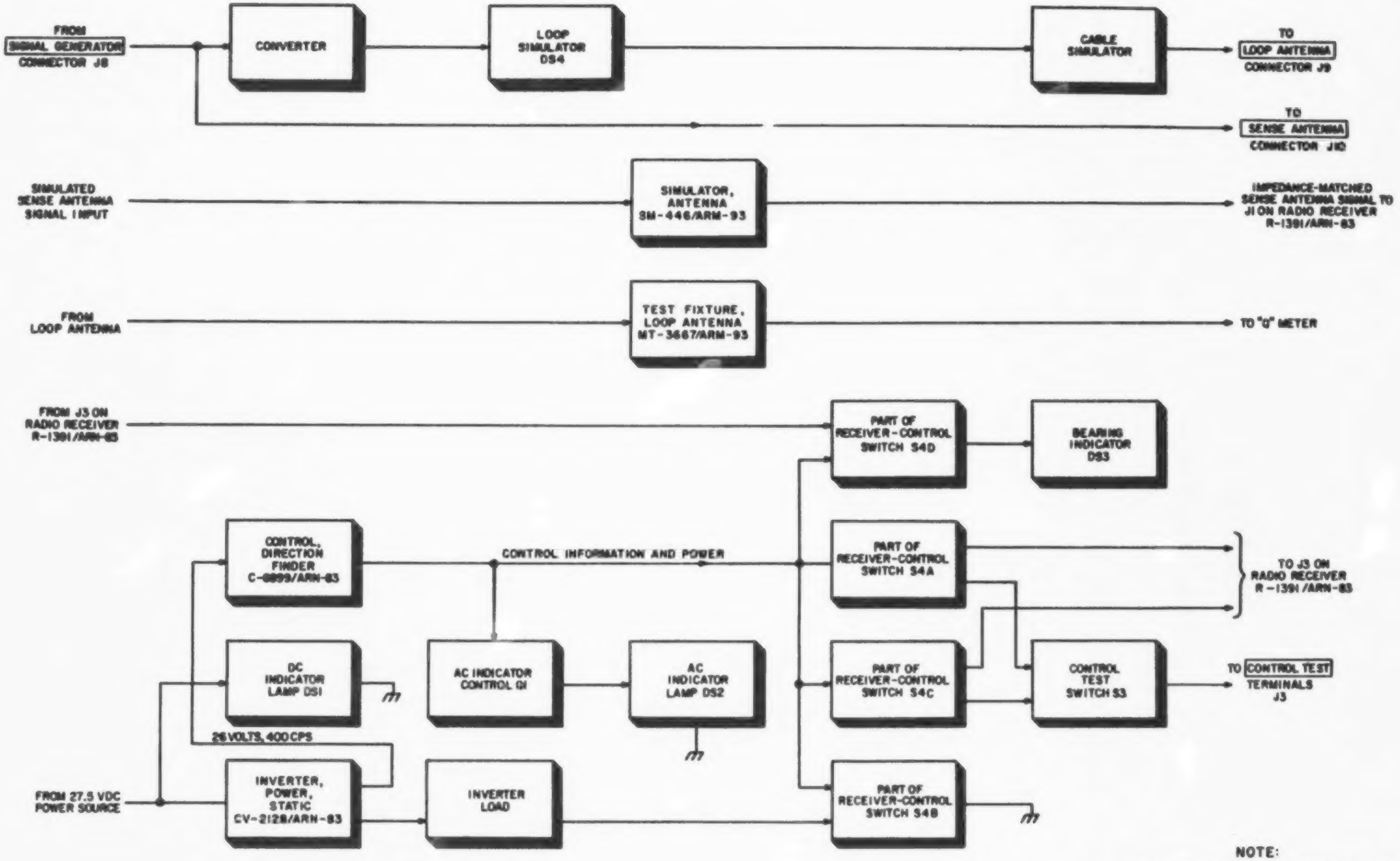
STD-R2

Figure 4-12. Color code marking for MIL-STD resistors.

CHAPTER 5

ILLUSTRATIONS

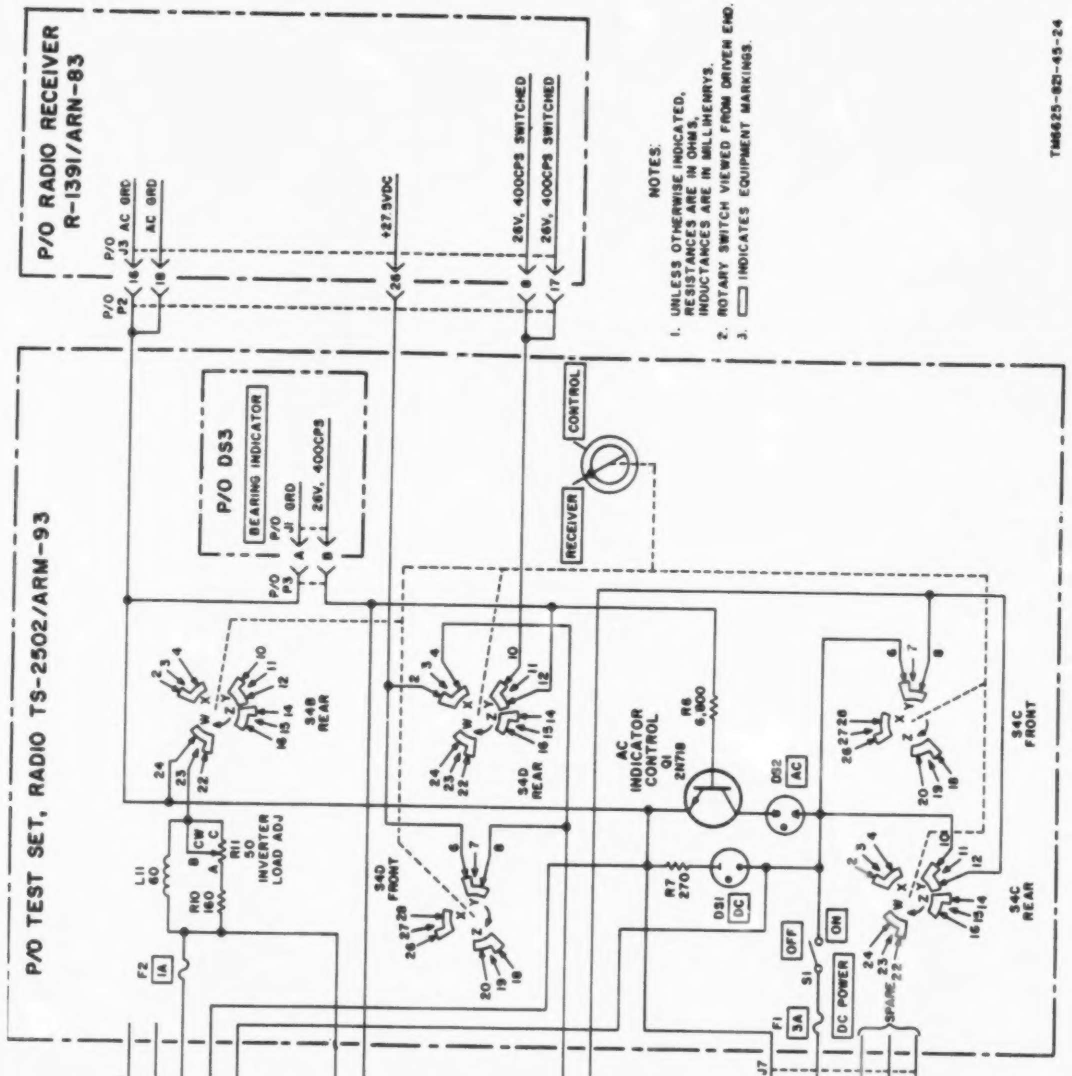
This chapter contains foldout illustrations which have been initially referenced in chapters 1 and 3.


FROM SIGNAL GENERATOR CONNECTOR J8
CONVERTER
LOOP SIMULATOR DS4
CABLE SIMULATOR
TO LOOP ANTENNA CONNECTOR J9
TO SENSE ANTENNA CONNECTOR J10
SIMULATED SENSE ANTENNA SIGNAL INPUT
SIMULATOR, ANTENNA SM-446/ARM-93
IMPEDANCE-MATCHED SENSE ANTENNA SIGNAL TO J1 ON RADIO RECEIVER R-1391/ARN-83
FROM LOOP ANTENNA
TEST FIXTURE, LOOP ANTENNA MT-3667/ARM-93
TO "Q" METER
FROM J3 ON RADIO RECEIVER R-1391/ARN-83
PART OF RECEIVER-CONTROL SWITCH S4D
BEARING INDICATOR DS3
CONTROL, DIRECTION FINDER C-6899/ARN-83
CONTROL INFORMATION AND POWER
PART OF RECEIVER-CONTROL SWITCH S4A
TO J3 ON RADIO RECEIVER R-1391/ARN-83
DC INDICATOR LAMP DS1
AC INDICATOR CONTROL Q1
AC INDICATOR LAMP DS2
PART OF RECEIVER-CONTROL SWITCH S4C
CONTROL TEST SWITCH S3
TO CONTROL TEST TERMINALS J3
26 VOLTS, 400 CPS
FROM 27.5 VDC POWER SOURCE
INVERTER, POWER, STATIC CV-2128/ARN-83
INVERTER LOAD
PART OF RECEIVER-CONTROL SWITCH S4B

NOTE:
▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-1

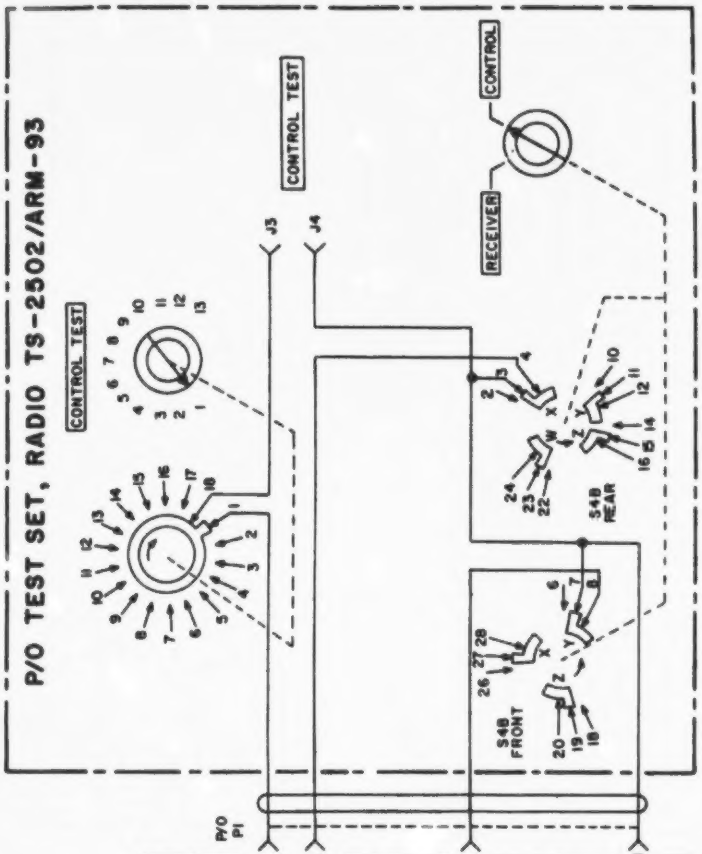
Figure 5-2. Test Set, Direction Finder Set AN/ARM-93, overall functional block diagram.


P/O RADIO RECEIVER R-1391/ARN-83
P/O J3
P/O P2
16
18
26
8
17
AC GRD
AC GRD
+27.5VDC
26V, 400CPS SWITCHED
26V, 400CPS SWITCHED
P/O TEST SET, RADIO TS-2502/ARM-93
P/O DS3
BEARING INDICATOR
P/O J1
P/O P3
A
B
GRD
26V, 400CPS
RECEIVER
CONTROL
L11 60
R10 160
R11 50 INVERTER LOAD ADJ
CW
F2
1A
S4B REAR
S4D REAR
S4D FRONT
S4C FRONT
S4C REAR
AC INDICATOR CONTROL Q1 2N718
R6 6,800
R7 270
DS1
DC
DS2
AC
S1
OFF
ON
DC POWER
F1
3A
SPARE
P/O J7
GRD
+27.5VDC INPUT
J6
INVERTER POWER, STATIC CV-2128/ARN-83
P1
SPARE
26V, 400CPS
GRD
+27.5VDC
P/O CONTROL, DIRECTION FINDER C-6899/ARN-83
P/O P301
P/O P1
S302B REAR
OFF
ADF
ANT
LOOP
FUNCTION SWITCH
TM6625-821-45-24

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, INDUCTANCES ARE IN MILLIHENRYS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

Figure 5-4. Power circuit, schematic diagram.

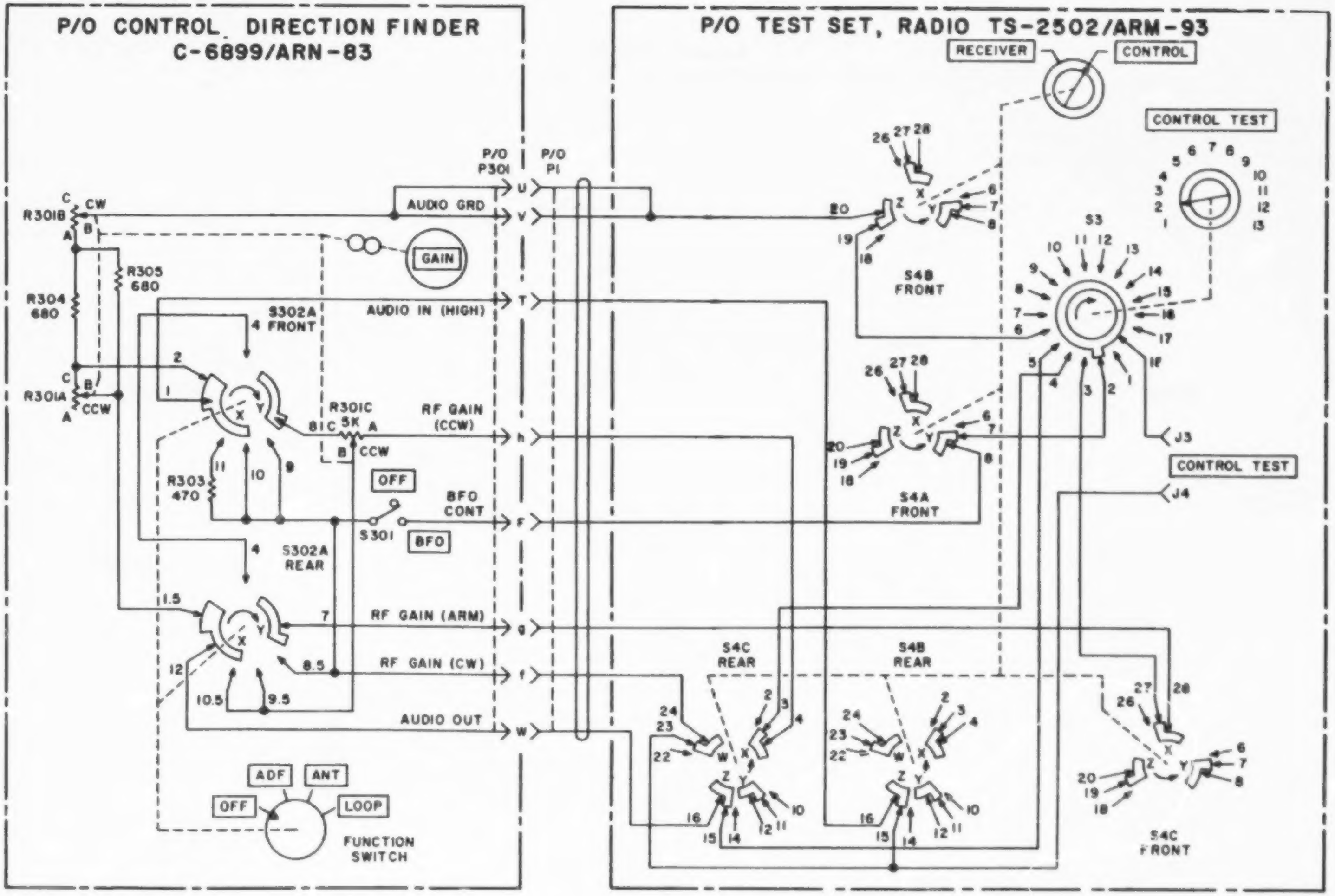

P/O TEST SET, RADIO TS-2502/ARM-93
CONTROL TEST
1 2 3 4 5 6 7 8 9 10 11 12 13
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
J3
J4
CONTROL TEST
RECEIVER
CONTROL
S4B REAR
S4B FRONT
W X Y Z
2 3 4 10 11 12 14 15 16 22 23 24
6 7 8 18 19 20 26 27 28
P/O P1
P/O P301
J K L M
GRD
P/O CONTROL, DIRECTION FINDER C-6899/ARN-83
MANUAL LOOP CONT (COM)
MANUAL LOOP CONT (CCW)
MANUAL LOOP CONT (CW)
R306 4,700
R307 4,700
S303
1.5 2.5 3.5 4.5 5.5 9
LOOP
L
R

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-19

Figure 5-7. Circuit for checking manual LOOP control circuit, schematic diagram.

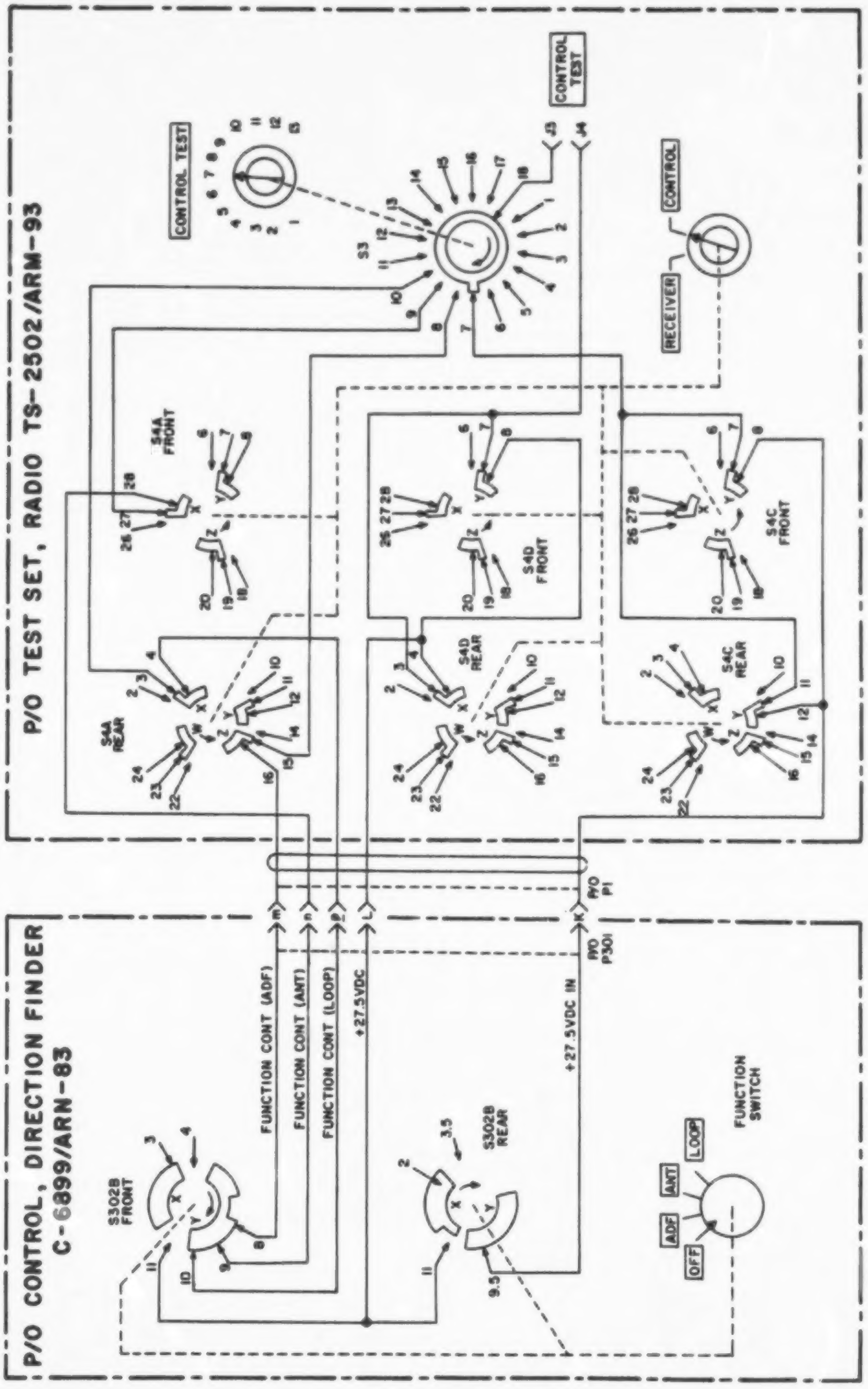

P/O CONTROL, DIRECTION FINDER
C-6899/ARN-83
P/O TEST SET, RADIO TS-2502/ARM-93
RECEIVER
CONTROL
CONTROL TEST
CONTROL TEST
P/O P301
P/O P1
AUDIO GRD
GAIN
AUDIO IN (HIGH)
RF GAIN (CCW)
BFO CONT
OFF
BFO
S301
RF GAIN (ARM)
RF GAIN (CW)
AUDIO OUT
R301B
R301A
R301C 5K
R303 470
R304 680
R305 680
S302A FRONT
S302A REAR
OFF
ADF
ANT
LOOP
FUNCTION SWITCH
S3
S4B FRONT
S4A FRONT
S4C REAR
S4B REAR
S4C FRONT
J3
J4
U
V
T
h
F
g
f
W

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-20

Figure 5-8. Circuits for checking bfo, rf gain control, and audio gain control, schematic diagram.

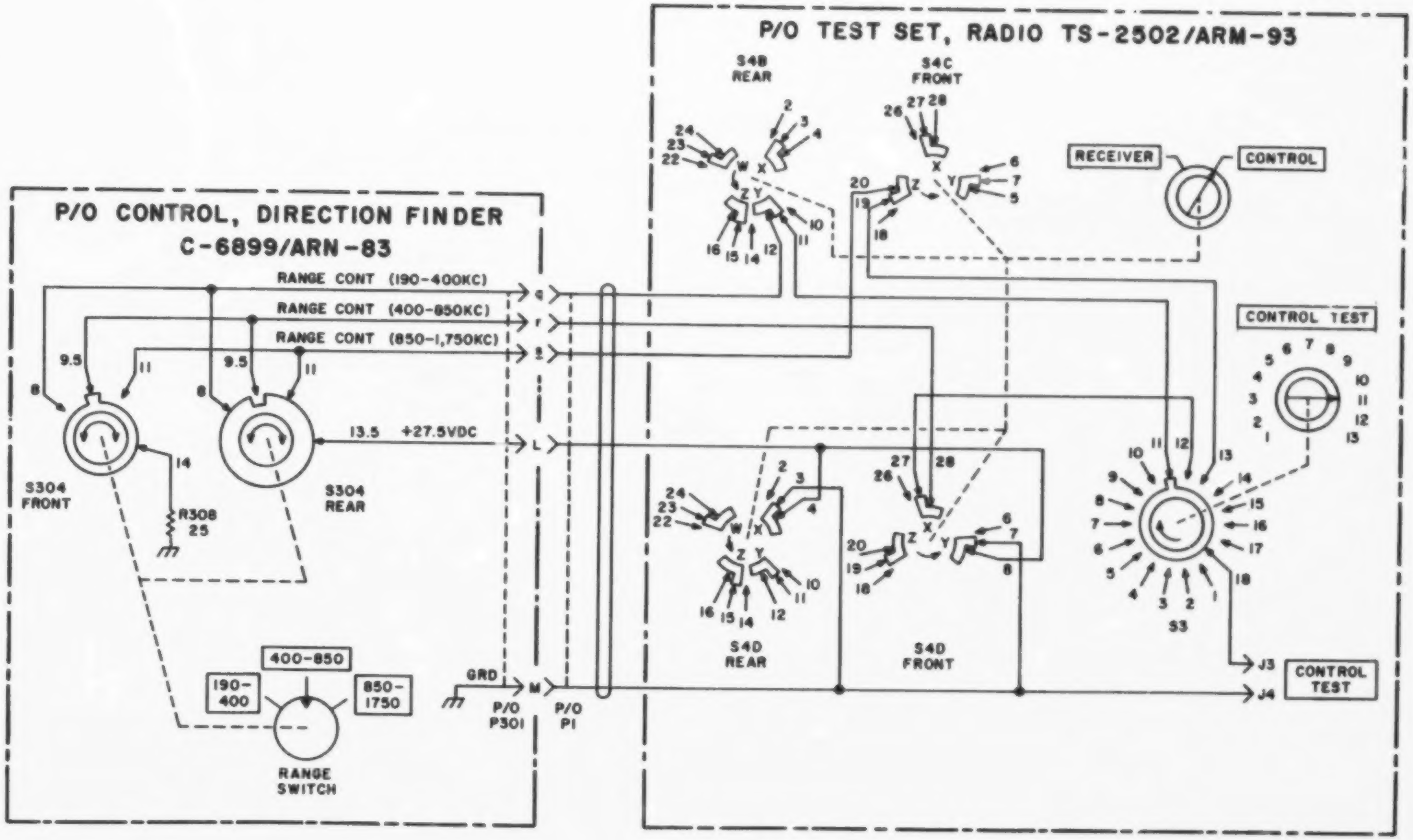

P/O TEST SET, RADIO TS-2502/ARM-93
CONTROL TEST
1 2 3 4 5 6 7 8 9 10 11 12 13
CONTROL TEST
S3
J3
J4
RECEIVER
CONTROL
S4A FRONT
S4D FRONT
S4C FRONT
S4A REAR
S4D REAR
S4C REAR
X
Y
Z
W
P/O P1
P/O P301
m
n
e
L
K
P/O CONTROL, DIRECTION FINDER C-6899/ARN-83
FUNCTION CONT (ADF)
FUNCTION CONT (ANT)
FUNCTION CONT (LOOP)
+27.5VDC
+27.5VDC IN
S302B FRONT
S302B REAR
3.5
9.5
OFF
ADF
ANT
LOOP
FUNCTION SWITCH

NOTES:

1. ROTARY SWITCH VIEWED FROM DRIVEN END.
2. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-22

Figure 5-9. Circuits for checking function control, schematic diagram.

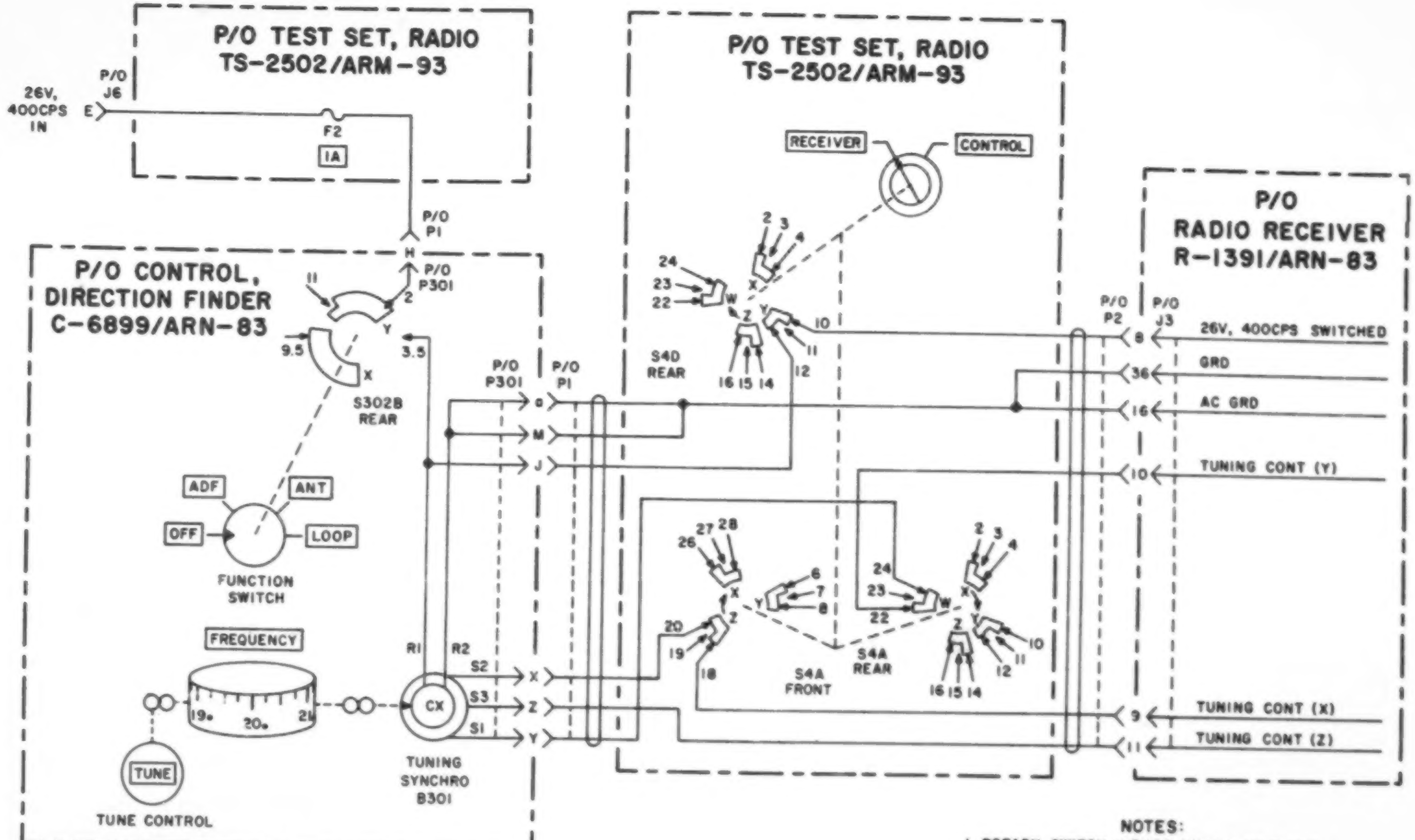

P/O CONTROL, DIRECTION FINDER
C-6899/ARN-83
RANGE CONT (190-400KC)
RANGE CONT (400-850KC)
RANGE CONT (850-1,750KC)
9.5
11
8
13.5
+27.5VDC
14
S304
FRONT
S304
REAR
R308
25
400-850
190-
400
850-
1750
RANGE
SWITCH
GRD
P/O
P301
P/O
P1
q
r
s
L
M
P/O TEST SET, RADIO TS-2502/ARM-93
S4B
REAR
S4C
FRONT
S4D
REAR
S4D
FRONT
W
X
Y
Z
RECEIVER
CONTROL
CONTROL TEST
S3
J3
J4
CONTROL
TEST

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-19

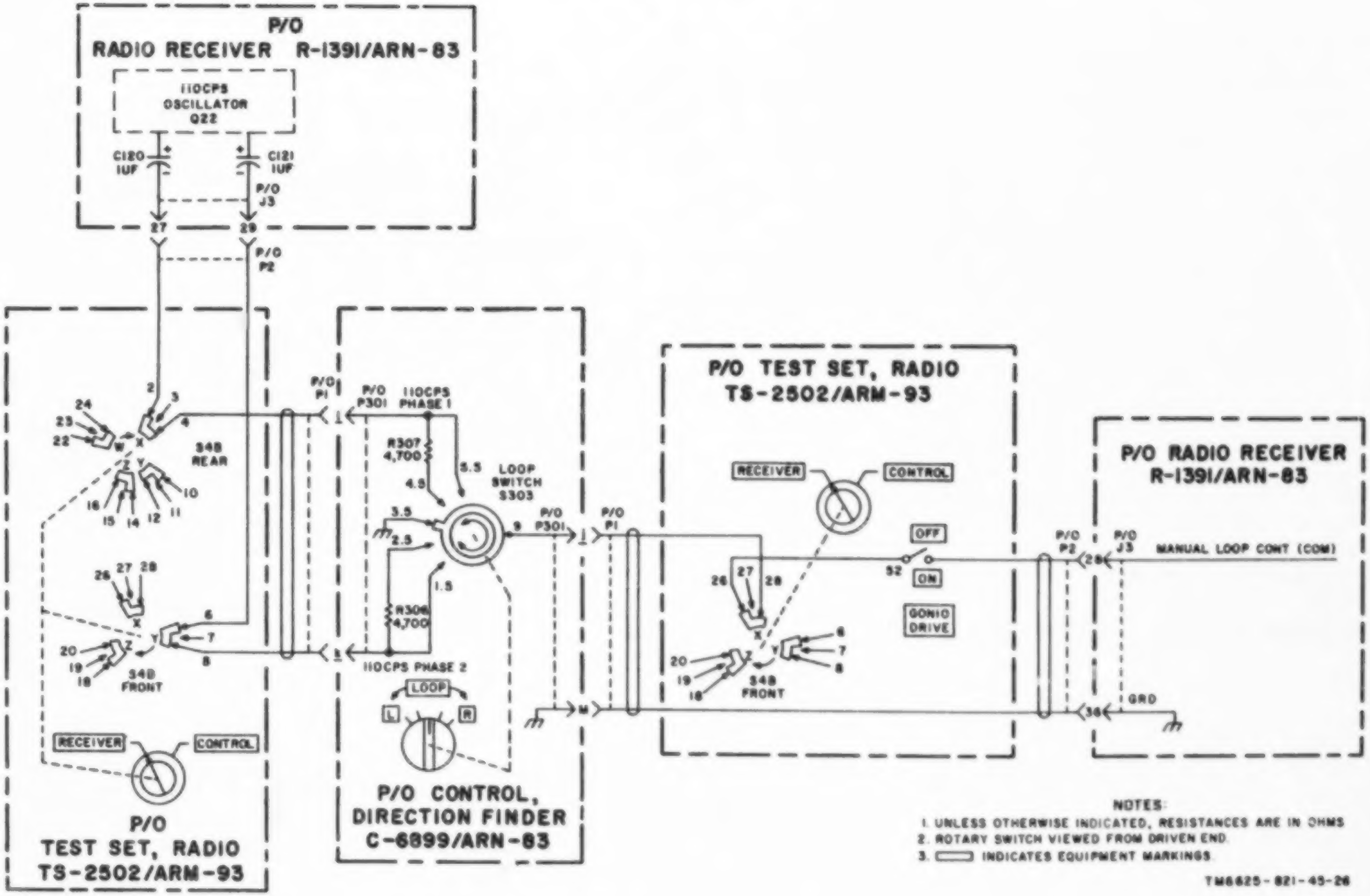
Figure 5-10. Circuit for checking range control, schematic diagram.


P/O TEST SET, RADIO
TS-2502/ARM-93
26V, 400CPS IN
P/O J6
E
F2
1A
P/O P1
H
P/O P301
P/O CONTROL, DIRECTION FINDER
C-6899/ARN-83
11
2
Y
9.5
3.5
X
S302B REAR
ADF
ANT
OFF
LOOP
FUNCTION SWITCH
FREQUENCY
19
20
21
TUNE
TUNE CONTROL
R1
R2
S2
S3
S1
CX
TUNING SYNCHRO B301
P/O P301
P/O P1
a
M
J
X
Z
Y
P/O TEST SET, RADIO
TS-2502/ARM-93
RECEIVER
CONTROL
2 3 4
24 23 22
W X Y Z
10 11 12
16 15 14
S4D REAR
26 27 28
6 7 8
20 19 18
S4A FRONT
S4A REAR
P/O P2
P/O J3
P/O
RADIO RECEIVER
R-1391/ARN-83
8
36
16
10
9
11
26V, 400CPS SWITCHED
GRD
AC GRD
TUNING CONT (Y)
TUNING CONT (X)
TUNING CONT (Z)

NOTES:
1. ROTARY SWITCH VIEWED FROM DRIVEN END.
2. ▭ INDICATES EQUIPMENT MARKINGS.

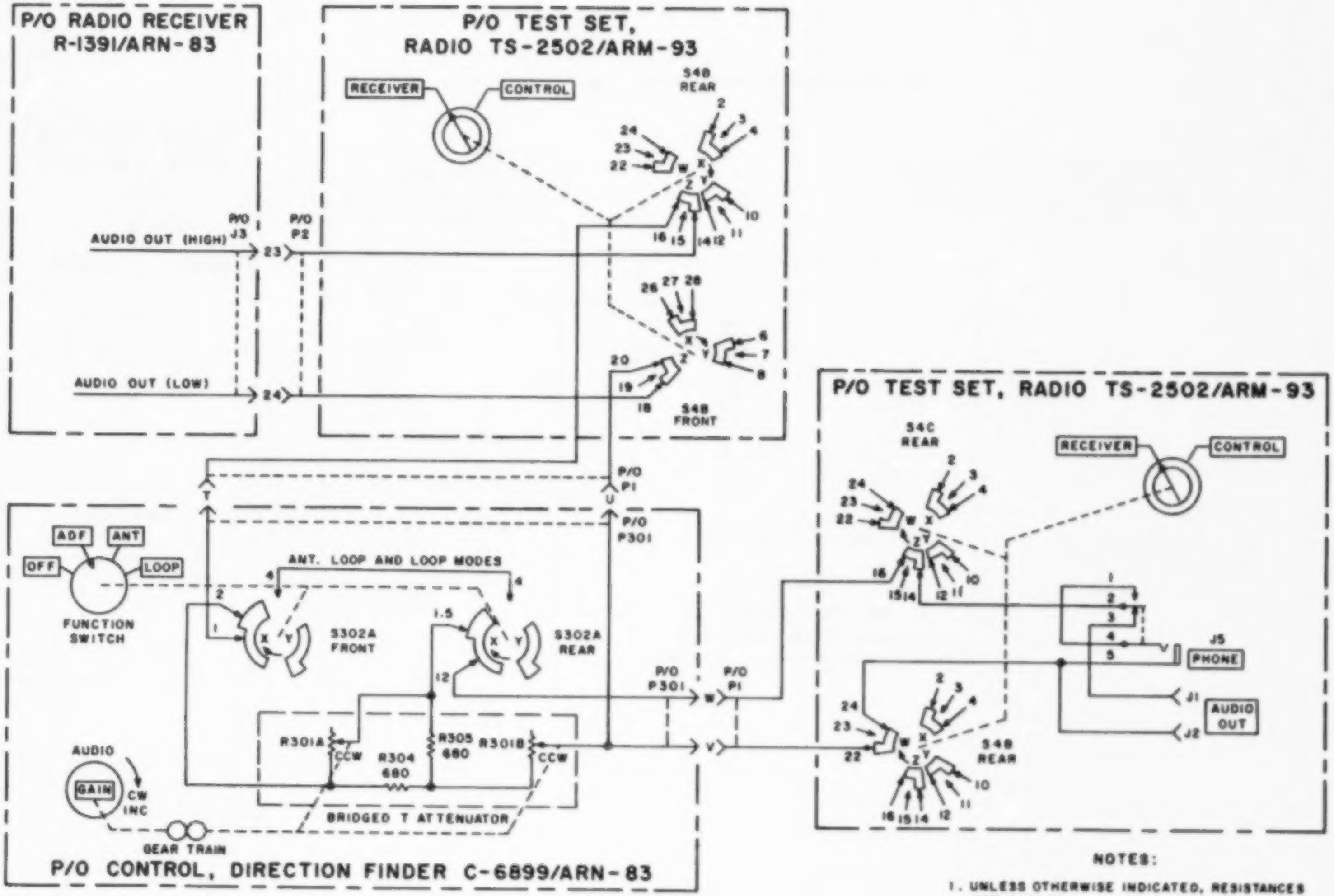
TM6625-821-45-25

Figure 5-12. Tuning control circuit, schematic diagram.


P/O
RADIO RECEIVER R-1391/ARN-83
110CPS
OSCILLATOR
Q22
C120
1UF
C121
1UF
P/O
J3
27
29
P/O
P2
2
3
4
24
23
22
W
X
34B
REAR
Z
Y
10
11
12
14
15
16
26
27
28
X
6
7
8
20
19
18
Z
Y
34B
FRONT
RECEIVER
CONTROL
P/O
TEST SET, RADIO
TS-2502/ARM-93
P/O
P1
P/O
P301
110CPS
PHASE 1
R307
4,700
4.5
5.5
LOOP
SWITCH
S303
3.5
2.5
9
1.5
R306
4,700
110CPS PHASE 2
LOOP
L
R
P/O
P301
P/O
P1
P/O CONTROL,
DIRECTION FINDER
C-6899/ARN-83
P/O TEST SET, RADIO
TS-2502/ARM-93
RECEIVER
CONTROL
OFF
S2
ON
GONIO
DRIVE
26
27
28
X
Y
6
7
8
20
19
18
34B
FRONT
P/O
P2
P/O
J3
28
MANUAL LOOP CONT (COM)
36
GRD
P/O RADIO RECEIVER
R-1391/ARN-83
TM6625-821-45-26

NOTES:
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

Figure 5-18. Manual LOOP control circuit, schematic diagram.

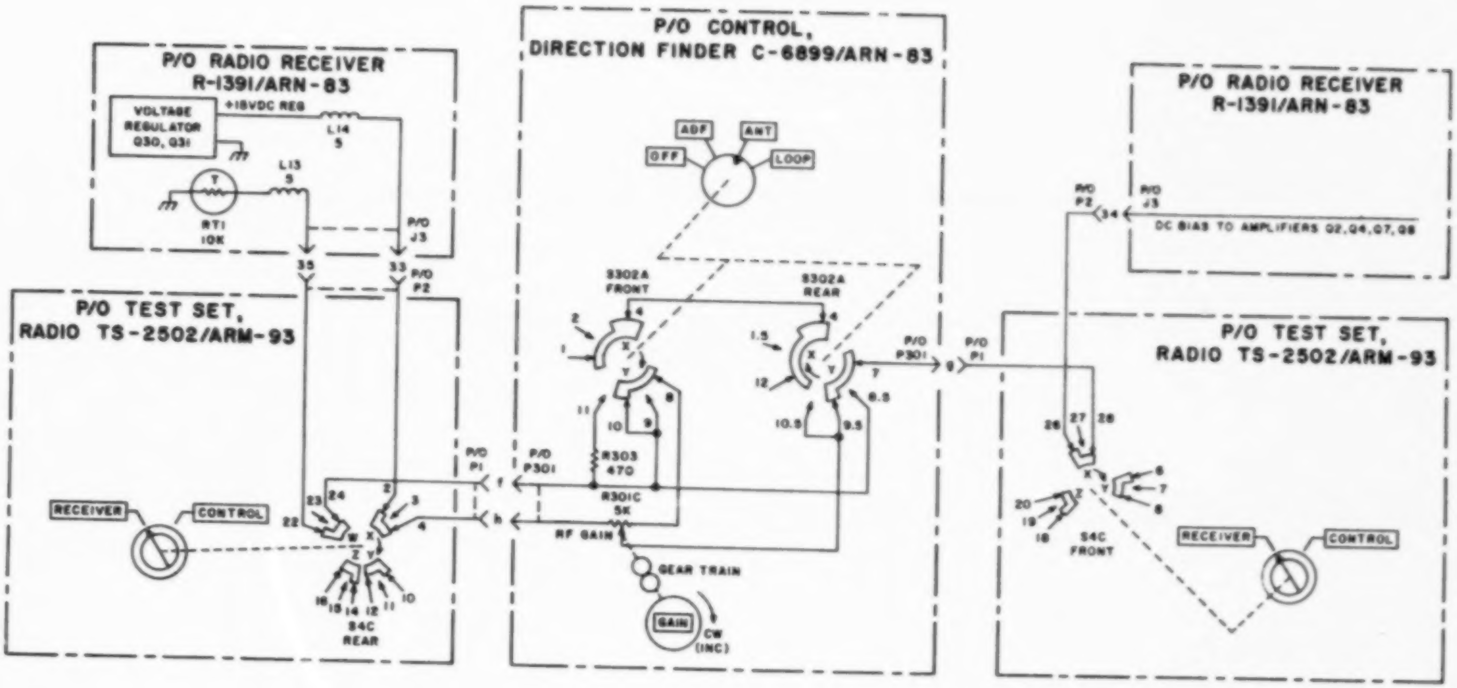

P/O RADIO RECEIVER R-1391/ARN-83
AUDIO OUT (HIGH)
AUDIO OUT (LOW)
P/O J3
P/O P2
23
24
P/O TEST SET, RADIO TS-2502/ARM-93
RECEIVER
CONTROL
S4B REAR
S4B FRONT
P/O P1
P/O P301
T
U
W
V
P/O CONTROL, DIRECTION FINDER C-6899/ARN-83
OFF
ADF
ANT
LOOP
FUNCTION SWITCH
ANT. LOOP AND LOOP MODES
S302A FRONT
S302A REAR
R301A
R301B
R304 680
R305 680
CCW
BRIDGED T ATTENUATOR
AUDIO
GAIN
CW INC
GEAR TRAIN
P/O TEST SET, RADIO TS-2502/ARM-93
S4C REAR
S4B REAR
J5
PHONE
J1
J2
AUDIO OUT

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-27

Figure 5-14. Manual audio gain control circuit, schematic diagram.

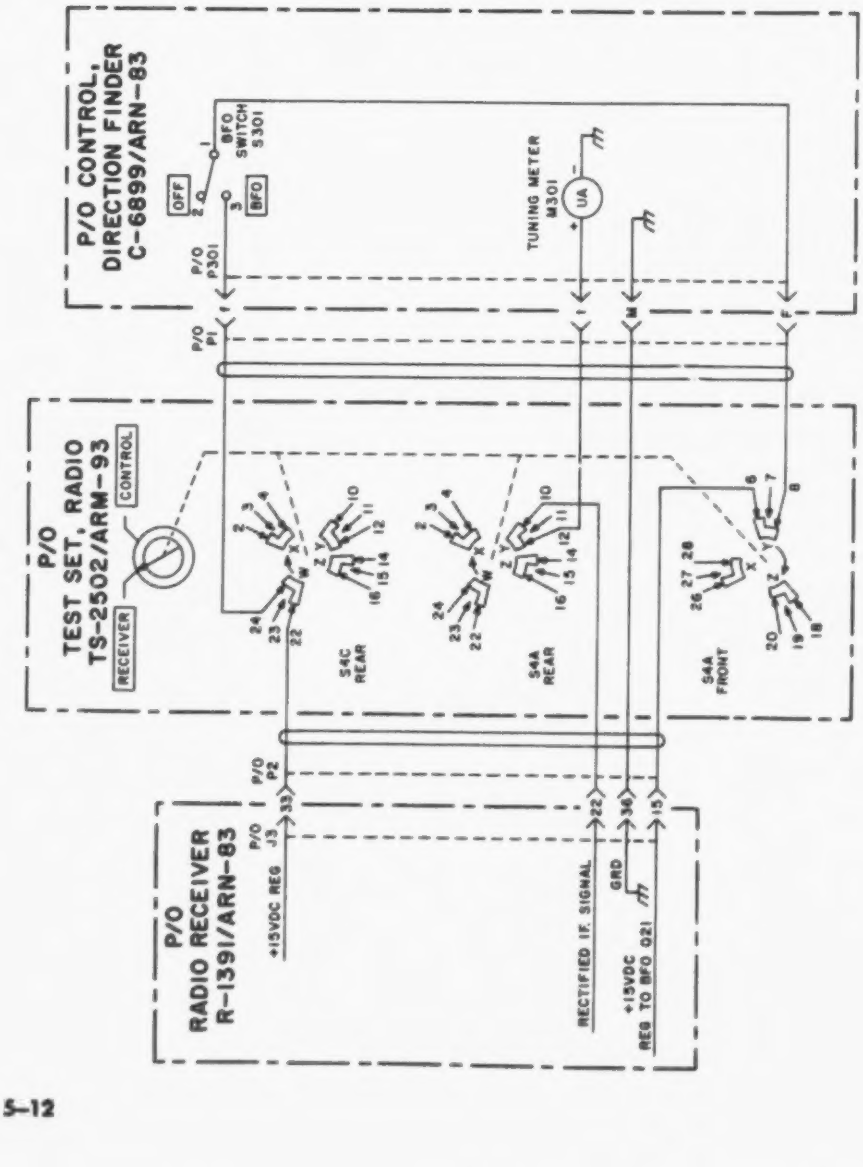

P/O RADIO RECEIVER
R-1391/ARN-83
VOLTAGE REGULATOR Q30, Q31
+18VDC REG
L14 5
L13 5
RT1 10K
T
P/O J3
35
33
P/O P2
P/O TEST SET, RADIO TS-2502/ARM-93
RECEIVER
CONTROL
22 23 24 2 3 4
W X Z Y
16 15 14 12 11 10
S4C REAR
P/O P1
f
h
P/O P301
P/O CONTROL, DIRECTION FINDER C-6899/ARN-83
OFF
ADF
ANT
LOOP
S302A FRONT
S302A REAR
1 2 4 8 9 10 11
1.5 12 4 7 8.5 9.5 10.5
R303 470
R301C 5K
RF GAIN
GEAR TRAIN
GAIN
CW (INC)
g
P/O RADIO RECEIVER
R-1391/ARN-83
P/O P2
P/O J3
34
DC BIAS TO AMPLIFIERS Q2,Q4,Q7,Q8
P/O TEST SET, RADIO TS-2502/ARM-93
26 27 28
6 7 8
20 19 18
S4C FRONT
RECEIVER
CONTROL

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, INDUCTANCES ARE IN MILLIHENRYS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-28

Figure 5–15. Manual rf gain control circuit, schematic diagram.


P/O
RADIO RECEIVER
R-1391/ARN-83
+15VDC REG
P/O
J3
RECTIFIED IF. SIGNAL
GRD
+15VDC
REG TO BFO Q21
33
22
36
15
P/O
P2
P/O
TEST SET, RADIO
TS-2502/ARM-93
RECEIVER
CONTROL
S4C
REAR
S4A
REAR
S4A
FRONT
W
X
Y
Z
2
3
4
10
11
12
14
15
16
22
23
24
6
7
8
18
19
20
26
27
28
P/O
P1
P/O
P301
P/O CONTROL,
DIRECTION FINDER
C-6899/ARN-83
OFF
2
3
BFO
1
BFO
SWITCH
S301
TUNING METER
M301
UA
+
-
I
M
F

NOTES:
1. ROTARY SWITCH VIEWED FROM DRIVEN END
2. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-29

Figure 5-16. Bfo switching and tuning meter circuits, schematic diagram.

INDEX

	Paragraph	Page
Alignment:		
BEARING INDICATOR		
Control unit	3-17	3-10
Inverter	3-19	3-10
Inverter load	3-18	3-10
LOOP SIMULATOR	3-14	3-8
LOOP SIMULATOR impedance	3-15	3-8
Test equipment and additional equipment required	3-16	3-9
BEARING INDICATOR:	3-13	3-7
Adjustment		
Reassembly and replacement	3-17	3-10
Removal and disassembly	3-11	3-5
Block diagram analysis	3-6	3-3
Block diagram, fig. 5-2	1-2	1-1
Control unit:	----	5-2
Adjustment		
Physical tests and inspection	3-19	3-10
Reassembly and replacement	4-8	4-7
Removal and disassembly	3-9	3-3
Schematic diagram, fig. 5-5	3-4	3-2
Test		
Depot overhaul standards. (*See* general support testing procedures.)	4-9	4-11
Disassembly:		
BEARING INDICATOR		
Exploded view, fig. 3-2	3-6	3-3
Control unit	----	3-7
Inverter	3-4	3-2
LOOP SIMULATOR	3-3	3-2
Exploded view, fig. 3-1	3-5	3-2
Techniques	----	3-6
Fabricated equipment	3-2	3-1
Functioning, detailed:	4-4	4-2
Control section		
General	1-5	1-5
Loop test fixture	1-3	1-2
Receiver section	1-6	1-9
Functioning, general	1-4	1-3
Functioning, interunit:	1-2	1-1
Bfo switching and tuning meter circuits		
Simplified schematic, fig. 5-16	1-13	1-12
Function and frequency range selection	----	5-12
Simplified schematic, fig. 5-11	1-8	1-10
General		
Manual audio gain control circuit	1-7	1-9
Simplified schematic, fig. 5-14	1-11	1-11
Manual LOOP control	----	5-10
Simplified schematic, fig. 5-13	1-10	1-10
Manual rf gain control circuit	----	5-9
Simplified schematic, fig. 5-15	1-12	1-11
Tuning control	----	5-11
Simplified schematic, fig. 5-12	1-9	1-10
	----	5-8

	Paragraph	Page
General support testing procedures and depot overhaul standards:		
Control unit physical tests and inspection	4-8	4-7
Control unit tests	4-9	4-11
Fabricated equipment	4-4	4-2
General	4-1	4-1
Inverter physical tests and inspection	4-6	4-4
Inverter tests	4-7	4-7
LOOP SIMULATOR impedance test	4-17	4-27
LOOP SIMULATOR output test	4-18	4-29
LOOP SIMULATOR resolver test	4-16	4-25
Loop test fixture physical tests and inspection	4-10	4-13
Loop test fixture tests	4-11	4-15
Modification work orders	4-5	4-2
Sense antenna adapter physical tests and inspection	4-12	4-17
Sense antenna adapter test	4-13	4-19
Test equipment, tools, and materials required	4-2	4-1
Test facilities	4-3	4-2
Test set physical tests and inspection	4-14	4-21
Test set control circuitry test. (See control unit tests.)		
Test set receiver circuitry test	4-15	4-23
Inverter:		
Adjustment	3-18	3-10
Detailed functioning (See detailed function of receiver section.)		
Disassembly	3-3	3-2
Reassembly	3-8	3-3
Removal	3-7	3-3
Replacement	3-8	3-3
Schematic diagram, fig. 1-2	----	1-6
Troubleshooting. (See troubleshooting chart.)		
Voltage measurements	2-6	2-5
LOOP SIMULATOR:		
Alignment	3-15	3-8
Disassembly	3-5	3-2
Impedance adjustment	3-16	3-9
Impedance test	4-17	4-27
Output test	4-18	4-29
Reassembly	3-10	3-4
Removal	3-5	3-2
Replacement	3-10	3-4
Resolver test	4-16	4-25
Loop test fixture:		
Physical tests and inspection	4-10	4-13
Schematic diagram, fig. 1-4	----	1-9
Test	4-11	4-15
Reassembly:		
BEARING INDICATOR	3-11	3-5
Control unit	3-9	3-3
Inverter	3-8	3-3
LOOP SIMULATOR	3-10	3-4
Repairs:		
Parts replacement techniques	3-1	3-1
Removal and disassembly techniques	3-2	3-1
Removal:		
BEARING INDICATOR	3-6	3-3
Control unit	3-4	3-2
Inverter	3-3	3-2
LOOP SIMULATOR	3-5	3-2
Techniques	3-2	3-1
Test set front panel	3-7	3-3

	Paragraph	Page
Replacement:		
BEARING INDICATOR	3-11	3-5
Control unit	3-9	3-3
Inverter	3-8	3-3
LOOP SIMULATOR	3-10	3-4
Test set front panel	3-12	3-5
Scope	1-1	1-1
Sense antenna adapter:		
Physical tests and inspection	4-12	4-17
Schematic diagram, fig. 1-1	----	1-4
Test	4-13	4-19
Summary of test data	4-19	4-30
Test set:		
Detailed functioning of the control section	1-5	1-5
Detailed functioning of the receiver section	1-4	1-3
Functional block diagram analysis	1-2	1-1
Parts replacement techniques	3-1	3-1
Physical tests and inspection	4-14	4-21
Receiver circuitry test	4-14	4-23
Removal of front panel	3-7	3-3
Replacement of front panel	3-12	3-5
Troubleshooting. (See troubleshooting chart.)		
Troubleshooting:		
Chart	2-5	2-3
General	2-1	2-1
Organization of troubleshooting procedures	2-2	2-1
Test equipment required	2-3	2-1
Test setup	2-4	2-2
Voltage measurements for the inverter	2-6	2-5
Voltage diagram, fig. 2-8	----	2-10

By Order of the Secretary of the Army:

HAROLD K. JOHNSON
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-36 (Unclas) requirements for Direct and General Support Maintenance applicable to the OV-1A; OV-1B; OV-1C; U-8F; CH-47A; UH-1B, and UH-1D aircraft.

☆U.S. GOVERNMENT PRINTING OFFICE: 1990 - 262-912/30613

4–11. Loop Test Fixture Test

a. Test Equipment and Materials.

(1) Multimeter ME–26(*)/U.

(2) Q Meter TS–617(*)/U.

b. Test Connections and Conditions. Replace the fiberboard bottom of the loop test fixture. Refer to A, figure 4–6, and connect the COMMON lead of ME–26(*)/U to banana plug P3 on the loop test fixture. Connect the OHMS lead of ME–26(*)/U to pin F of connector P1 on the loop test fixture.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*ME–26(*)/U* SELECTOR: OHMS RANGE: RX10	*MT–3667/ARM–93* The switch on the loop test fixture may be set to any position.	*a.* Set the switch on the loop test fixture to position 1.	*a.* ME–26(*)/U should indicate 0 ohm.
			b. Connect the OHMS lead of ME–26(*)/U to pin B of connector P1 on the loop test fixture.	*b.* ME–26(*)/U should indicate infinity.
			c. Set the switch on the loop test fixture to position 2.	*c.* ME–26(*)/U should indicate 0 ohm.
			d. Clip the COMMON lead of ME–26(*)/U to banana plug P2, and the OHMS lead to pin D of connector P1 on the loop test fixture.	*d.* ME–26(*)/U should indicate 0 ohm.
			e. Set the switch on the loop test fixture to position 1.	*e.* ME–26(*)/U should indicate infinity.
			f. Connect the OHMS lead of ME–26(*)/U to pin H of connector P1 on the loop test fixture.	*f.* ME–26(*)/U should indicate 0 ohm.
2	*TS–617(*)/U* Connect the equipment as shown in B, figure 4–6. Set POWER ON switch to ON and allow a 5-minute warmup period.	*ME–3667/ARM–93* The switch on the loop test may be set to any position.	*a.* Adjust the MICRO MICRO FARADS INDUCTANCE control for a maximum indication on the CIRCUIT Q voltmeter.	*a.* A maximum indication should occur with the MICRO MICRO FARADS INDUCTANCE control set to approximately 400 micromicrofarads.
	Set the range switch to the 1.5–4.5 MC position.		*b.* Peak the CIRCUIT Q voltmeter indication with the vernier inductance control.	*b.* None.
	Set the FREQUENCY control to 2 megacycles. Turn the LEVEL-Q switch to the LEVEL position and rotate the ZERO ADJ LEVEL control until the CIRCUIT Q voltmeter reading is zero.		*c.* Note the capacitance indicated on the MICRO MICRO FARADS INDUCTANCE control and on the vernier inductance control. Record this capacitance as C1.	*c.* Approximately 400 micromicrofarads.
			d. Short across the 10-meghom resistor with a short piece of #12 AWG solid copper wire.	*d.* None.
	Turn the LEVEL-Q switch to the Q position and rotate the ZERO ADJ Q control until the CIRCUIT Q voltmeter reading is zero.		*e.* Set the vernier inductance control to zero, and adjust the MICRO MICRO FARADS INDUCTANCE control for a maximum indication on the CIRCUIT Q voltmeter.	*e.* A maximum indication should occur with the MICRO MICRO FARADS INDUCTANCE control set to approximately 286 micromicrofarads.
	Turn LEVEL-Q switch to the LEVEL position. Turn the RF ON switch to the ON position.		*f.* Peak the CIRCUIT Q voltmeter indication with the vernier inductance control.	*f.* None.
	Adjust the SET LEVEL FINE and SET LEVEL COARSE controls until the CIRCUIT Q voltmeter pointer is over the redline on the meter.		*g.* Note the capacitance indicated on the MICRO MICRO FARADS INDUCTANCE control and on the vernier inductance control. Record this capacitance as C_2.	*g.* Approximately 286 micromicrofarads.
	Set the Q RANGE switch to positions required to keep the CIRCUIT Q voltmeter within its range. Set the vernier inductance control to zero.		*h.* Use the recorded values of C_1 and C_2 in the following formula to calculate the value of capacitor C_1 in the loop test fixture: Capacitor C1 $= \frac{C^1-C^2}{C^1-C^2}$	*h.* Capacitor C1 should equal 1,000 ±110 micromicrofarads.

best copy available

4-15. Test Set Receiver Circuitry Test

a. Test Equipment and Materials. Multimeter ME-26(*)/U is required for the following test.

b. Test Connections and Conditions. Set test set DC POWER switch to OFF. Set test set RECEIVER-CONTROL switch to RECEIVER. Refer to figure 4-8 and the following procedure for equipment connections.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*ME-26(*)/U* SELECTOR: OHMS RANGE: RX10	*AN/ARM-93* GONIO DRIVE: ON	*a.* Connect ME-26(*)/U between pin 8 of P2 and pin J of P1.	*a.* ME-26(*)/U should indicate 0 ohm.
			b. Connect ME-26(*)/U between pin 9 of P2 and Pin X of P1.	*b.* Same as *a* above.
			c. Connect ME-26(*)/U between pin 10 of P2 and pin Y of P1.	*c.* Same as *a* above.
			d. Connect ME-26(*)/U betwwen pin 11 of P2 and pin Z of P1.	*d.* Same as *a* above.
			e. Connect ME-26(*)/U between pin 12 of P2 and pin m of P1.	*e.* Same as *a* above.
			f. Connect ME-26(*)/U between pin 13 of P2 and pin n of P1	*f.* Same as *a* above.
			g. Connect ME-26(*)/U between pin 14 of P2 and pin p of P1.	*g.* Same as *a* above.
			h. Connect ME-26(*)/U between pin 15 of P2 and pin F of P1.	*h.* Same as a above.
			i. Connect ME-26(*)/U between pin 16 of P2 and pin M of P1.	*i.* Same as *a* above.
			j. Connect ME-26(*)/U between pin 17 of P2 and pin J of P1.	*j.* Same as *a* above.
			k. Connect ME-26(*)/U between pin 18 of P2 and pin M of P1.	*k.* Same as *a* above.
			l. Connect ME-26(*)/U between pin 22 of P2 and pin t of P1.	*l.* Same as *a* above.
			m. Connect ME-26(*)/U between pin 23 of P2 and pin T of P1.	*m.* Same as *a* above.
			n. Connect ME-26(*)/U between pin 24 of P2 and pin U of P1.	*n.* Same as *a* above.
			o. Connect ME-26(*)/U between pin 24 of P2 and pin V of P1.	*o.* Same as *a* above.
			p. Connect ME-26(*)/U between pin 26 of P2 and pin c of P1.	*p.* Same as *a* above
			q. Connect ME-26(*)/U between pin 26 of P2 and pin L of P1.	*q.* Same as *a* above.
			r. Connect ME-26(*)/U between pin 27 of P2 and pin k of P1.	*r.* Same as *a* above.
			s. Connect ME-26(*)/U between pin 28 of P2 and pin j of P1.	*s.* Same as *a* above.
			t. Set GONIO DRIVE switch to the OFF position.	*t.* ME-26(*)/U should indicate infinity.
			u. Connect ME-26(*)/U between pin 29 of P2 and pin i of P1.	*u.* ME-26(*)/U should indicate 0 ohm.
			v. Connect ME-26(*)/U between pin 30 of P2 and pin q of P1.	*v.* Same as *u* above.
			w. Connect ME-26(*)/U between pin 31 of P2 and pin r of P1.	*w.* Same as *u* above.
			x. Connect ME-26(*)/U between pin 32 of P2 and pin s of P1.	*x.* Same as *u* above.
			y. Connect ME-26(*)/U between pin 33 of P2 and pin f of P1.	*y.* Same as *u* above.
			z. Connect ME-26(*)/U between pin 34 of P2 and pin g of P1.	*z.* Same as *u* above.
			aa. Connect ME-26(*)/U between pin 35 of P2 and pin h of P1.	*aa.* Same as *u* above.
			ab. Connect ME-26(*)/U between pin 36 of P2 and pin a of P1.	*ab.* Same as *u* above.
2	*ME-26(*)/U* Same as step 1.	*AN/ARM-93* The controls may be set to any position.	*a.* Disconnect ME-26(*)/U from test set connectors P1 and P2. Set DC POWER switch to the ON position.	*a.* The test set AC and DC lamps should light.
			b. Set DC POWER switch to the OFF position.	*b.* The test set AC and DC lamps should not light.

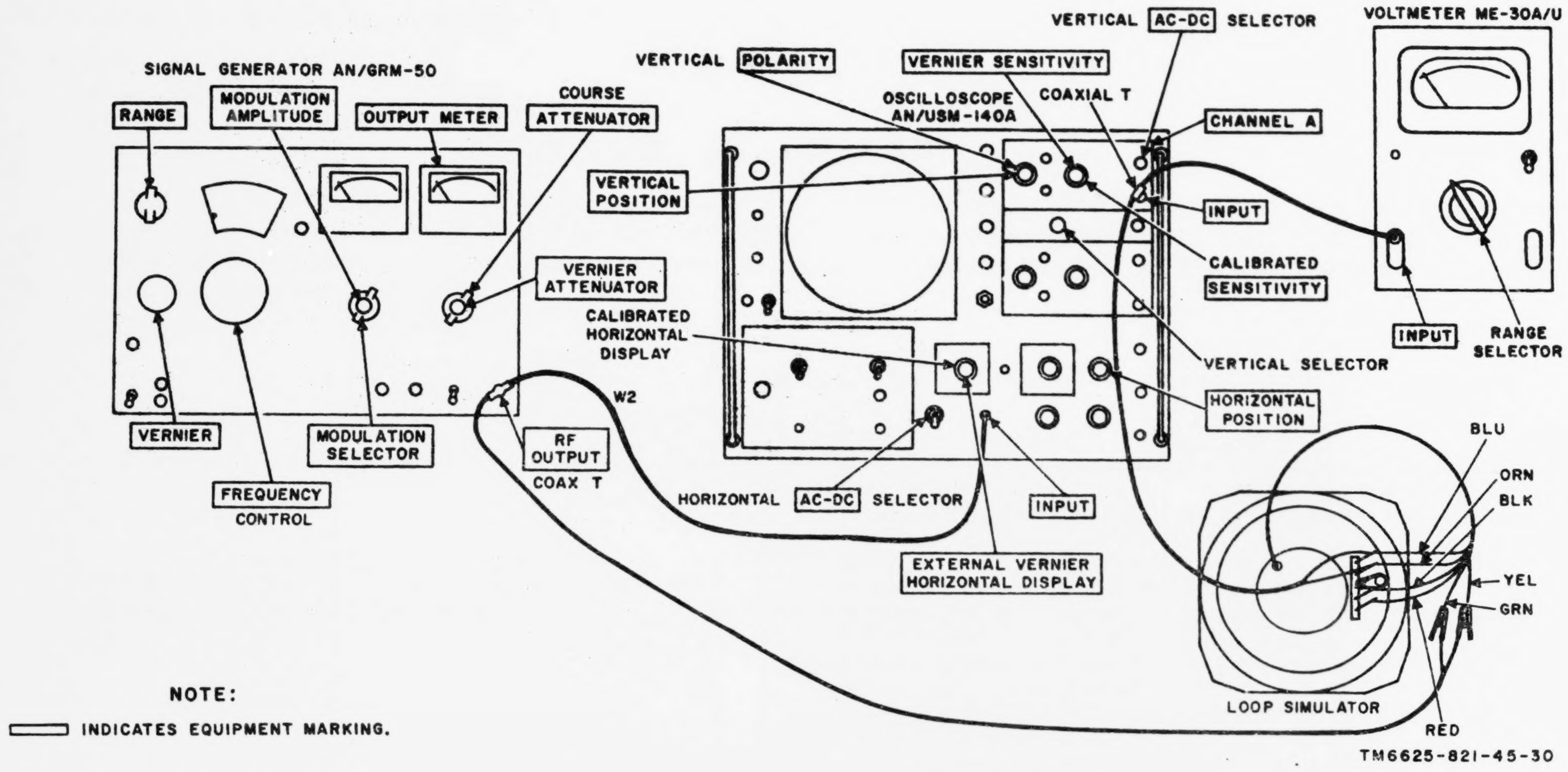

SIGNAL GENERATOR AN/GRM-50
RANGE
MODULATION AMPLITUDE
OUTPUT METER
COURSE ATTENUATOR
VERNIER ATTENUATOR
VERNIER
FREQUENCY CONTROL
MODULATION SELECTOR
RF OUTPUT
COAX T
W2
VERTICAL POLARITY
VERTICAL POSITION
CALIBRATED HORIZONTAL DISPLAY
OSCILLOSCOPE AN/USM-140A
VERNIER SENSITIVITY
COAXIAL T
VERTICAL AC-DC SELECTOR
CHANNEL A
INPUT
CALIBRATED SENSITIVITY
VERTICAL SELECTOR
HORIZONTAL POSITION
HORIZONTAL AC-DC SELECTOR
INPUT
EXTERNAL VERNIER HORIZONTAL DISPLAY
VOLTMETER ME-30A/U
INPUT
RANGE SELECTOR
BLU
ORN
BLK
YEL
GRN
RED
LOOP SIMULATOR
NOTE:
▭ INDICATES EQUIPMENT MARKING.
TM6625-821-45-30

Figure 4-9. LOOP SIMULATOR resolver test set up.

4-16. LOOP SIMULATOR Resolver Test

a. Test Equipment and Materials.

(1) Signal Generator AN/GRM-50.

(2) Oscilloscope AN/USM-140A.

(3) Voltmeter, Meter ME-30A/U or Electronic Voltmeter ME-30(*)/U.

b. Test Connections and Conditions. Remove the LOOP SIMULATOR from the test set front panel. Connect the equipment as shown in figure 4-9 with the hot lead from the AN/GRM-50 connected to the green lead of resolver B1, and the hot lead to AN/USM-140A connected to the blue lead of resolver B1. Throw the power switch on the AN/GRM-50 to the ON position, and allow a 15-minute warmup period.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*AN/GRM-50* Set to the RANGE selector to 50-170 KC. Adjust the FREQUENCY control and the VERNIER control until the output signal is 100 kc. Set the MODULATION SELECTOR to CW. Rotate the MODULATION AMPLITUDE control fully counterclockwise. Set the coarse ATTENUATOR to 3.0 volts. Adjust the VERNIER ATTENUATOR until the output meter indicates 3.0 volts. *AN/USM-140* Set the vertical POLARITY control to the +UP position. Set the calibrated SENSITIVITY control to the 1 position. Turn the VERNIER SENSITIVITY fully clockwise. Set vertical AC-DC selector to the AC position. Set the vertical selector to the CHANNEL A position. Set the horizontal AC-DC selector to the AC position. Turn the EXTERNAL VERNIER HORIZONTAL DISPLAY fully clockwise. Set the calibrated horizontal display to the 1 position. *ME-30(*)/U* Range selector: As required.	*AN/ARM-93* Set the LOOP SIMULATOR to E.	*a.* While observing the ME-30(*)/U indication, rotate the LOOP SIMULATOR towards N. *b.* Rotate the LOOP SIMULATOR 5° clockwise from N. Center the pattern on the N/USM-140A with the VERTICAL POSITION and the HORIZONTAL POSITION controls.	*a.* ME-30(*)/U should indicate a null when the LOOP SIMULATOR is set to N. *b.* A 1 :1 Lissajous pattern should appear on the AN/USM-140A with the top of the pattern tilted into the upper right-hand quadrant.

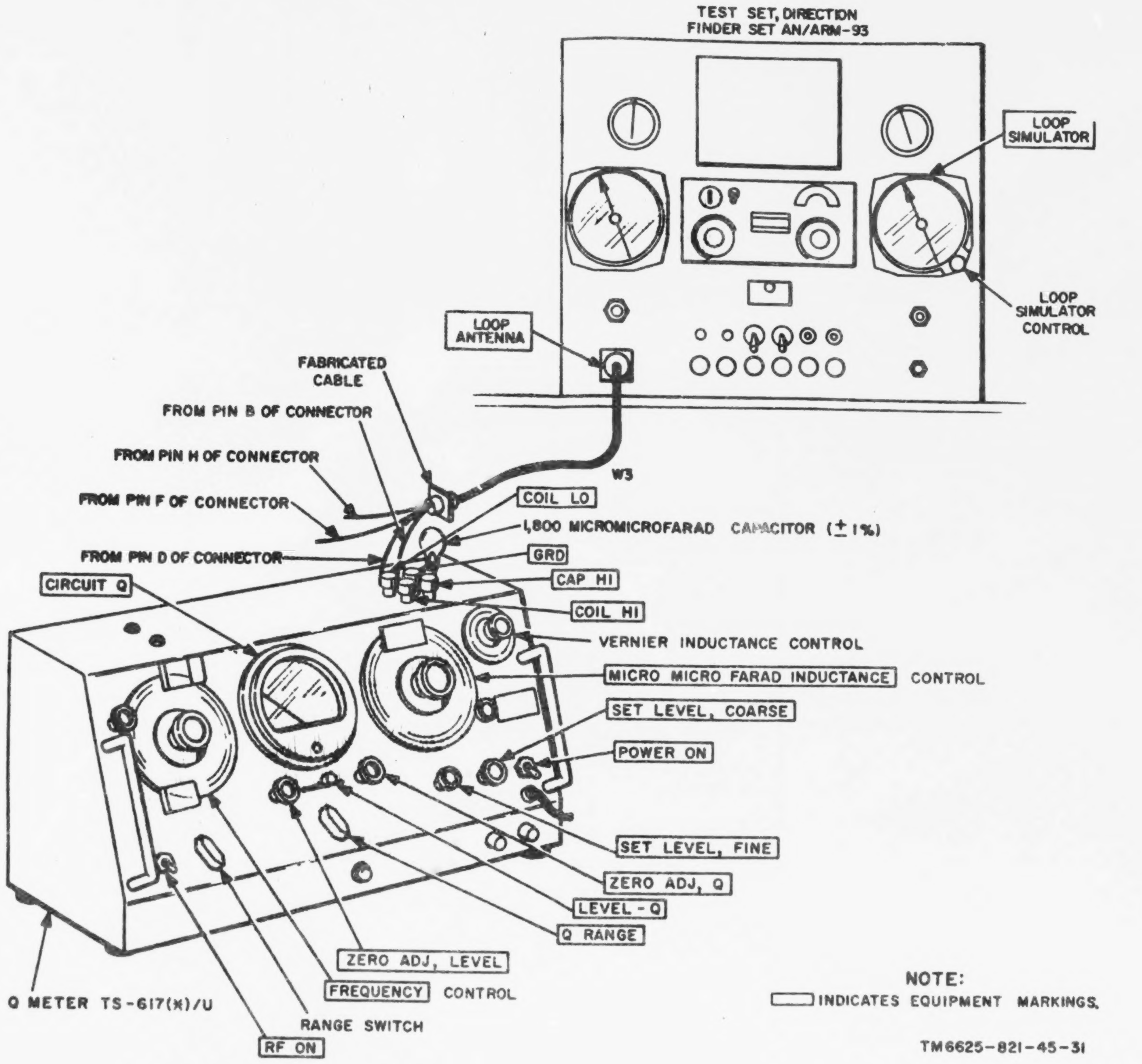

TEST SET, DIRECTION FINDER SET AN/ARM-93
LOOP SIMULATOR
LOOP SIMULATOR CONTROL
LOOP ANTENNA
FABRICATED CABLE
FROM PIN B OF CONNECTOR
FROM PIN H OF CONNECTOR
FROM PIN F OF CONNECTOR
FROM PIN D OF CONNECTOR
W3
COIL LO
1,800 MICROMICROFARAD CAPACITOR (± 1%)
GRD
CAP HI
COIL HI
CIRCUIT Q
VERNIER INDUCTANCE CONTROL
MICRO MICRO FARAD INDUCTANCE CONTROL
SET LEVEL, COARSE
POWER ON
SET LEVEL, FINE
ZERO ADJ, Q
LEVEL - Q
Q RANGE
ZERO ADJ, LEVEL
FREQUENCY CONTROL
Q METER TS-617(*)/U
RANGE SWITCH
RF ON
NOTE:
INDICATES EQUIPMENT MARKINGS.
TM6625-821-45-31

Figure 4-10. LOOP SIMULATOR impedance test setup.

4–17. LOOP SIMULATOR Impedance Test

a. Test Equipment and Materials.

(1) Q Meter TS–617(*)/U.

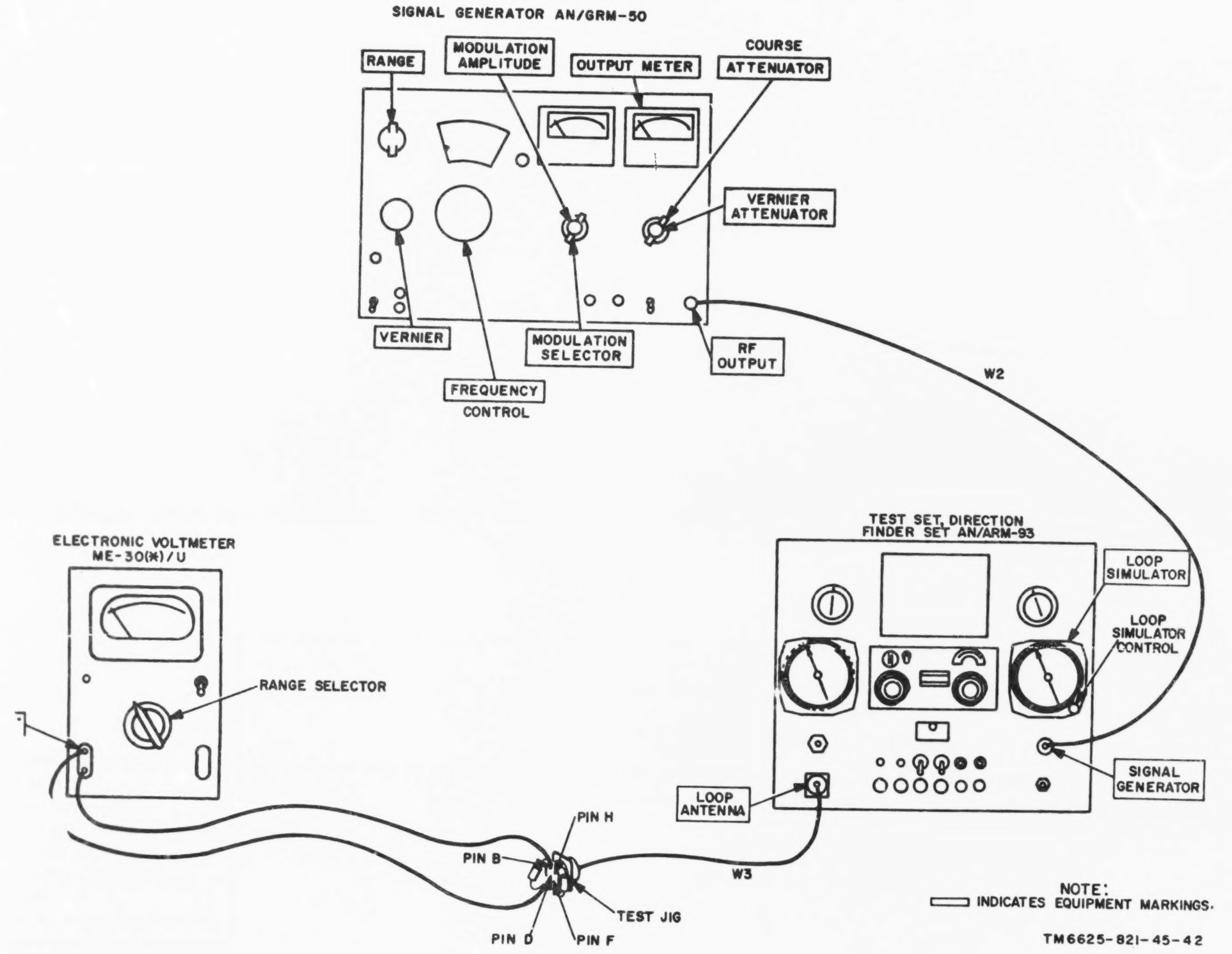
(2) Fabricated cable for the LOOP SIMULATOR.

(3) 1,800-micromicrofarad capacitor.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4–10. Set the TS–617(*)/U POWER ON switch to the ON position, and allow a 5-minute warmup period.

c. Procedure.

Step	Control Settings		Test Procedure	Performance standard
	Test equipment	Equipment under test		
1	*TS–617(*)/U* Set the range switch to the 450–1500KC position. Set the FREQUENCY control to 650 kc. Turn the LEVEL-Q switch to the LEVEL position and rotate the ZERO ADJ LEVEL control until the CIRCUIT Q voltmeter reading is zero. Turn the LEVEL-Q switch to the Q position and rotate the ZERO ADJ, Q control until the CIRCUIT Q voltmeter reading is zero. Turn the LEVEL-Q switch to the LEVEL position. Set the RF ON switch to the ON position. Adjust the SET LEVEL FINE and the SET LEVEL COARSE controls until the CIRCUIT Q voltmeter pointer is over the red line on the meter. Turn the LEVEL-Q switch to the Q position. Set the vernier inductance control to zero. Set the MICRO MICRO FARADS INDUCTANCE control to 200 micromicrofarads. Set the Q RANGE switch to positions required to keep the CIRCUIT Q voltmeter within its range.	*AN/ARM–93* The controls may be set to any position.	Adjust the LOOP SIMULATOR on the test set so the needle points to N.	TS–617(*)/U should indicate a Q of not less than 20.
2	*TS–617( )/U* No change from step 1.	*AN/ARM–43* The controls may be set to any position.	Disconnect the fabricated cable from TS–618/U. Using the fabricated cable, connect pins F and H of cable W3 to the COIL terminals of TS–617/U. Adjust the LOOP SIMULATOR on the test set so the needle points to E.	TS–617/U will indicate a Q of not less than 20.


SIGNAL GENERATOR AN/GRM-50
RANGE
MODULATION AMPLITUDE
OUTPUT METER
COURSE ATTENUATOR
VERNIER ATTENUATOR
VERNIER
FREQUENCY CONTROL
MODULATION SELECTOR
RF OUTPUT
W2
TEST SET, DIRECTION FINDER SET AN/ARM-93
LOOP SIMULATOR
LOOP SIMULATOR CONTROL
SIGNAL GENERATOR
LOOP ANTENNA
W3
ELECTRONIC VOLTMETER ME-30(*)/U
RANGE SELECTOR
PIN H
PIN B
PIN D
PIN F
TEST JIG

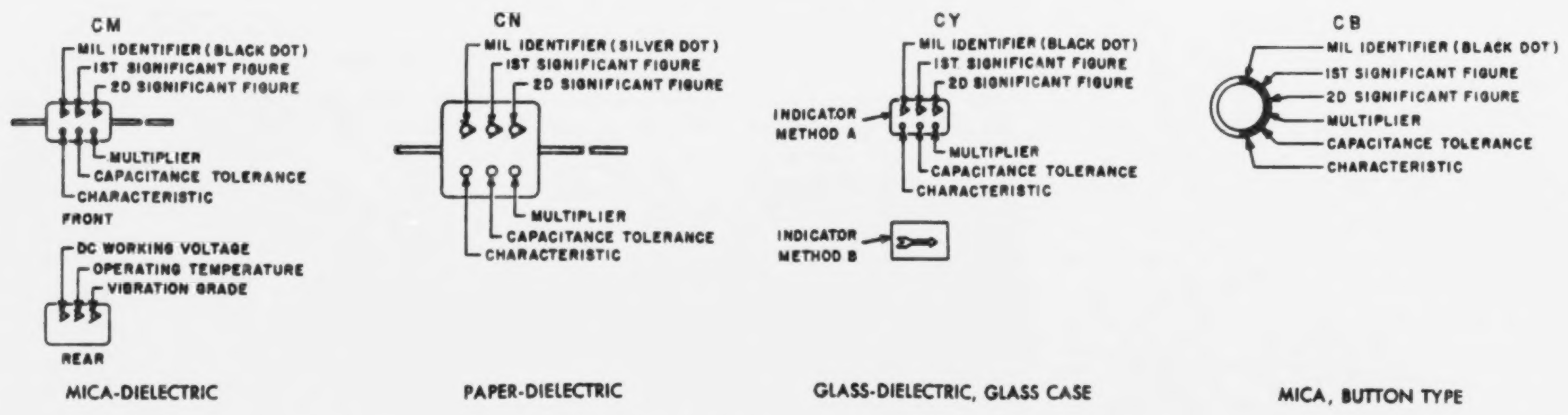
NOTE:
▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-42

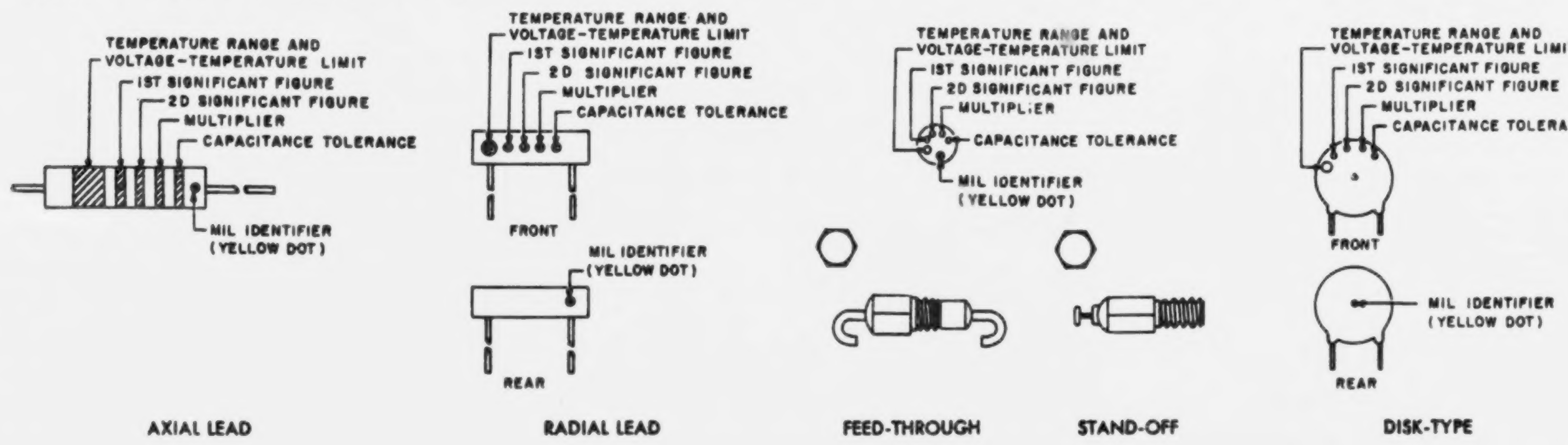
Figure 4-11. LOOP SIMULATOR output test.

COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

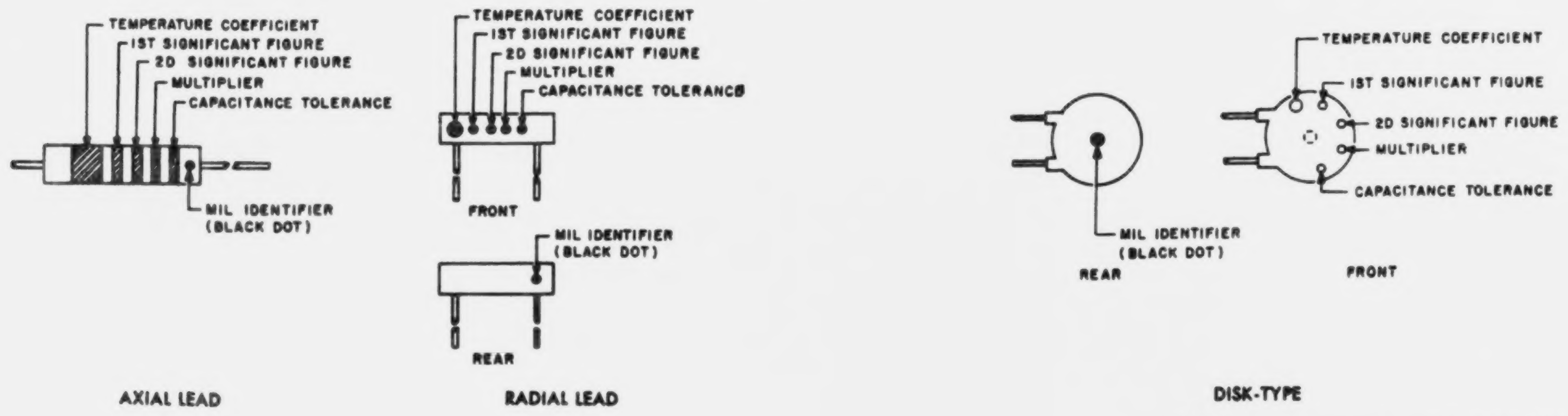
GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB


CM
MIL IDENTIFIER (BLACK DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC
FRONT
DC WORKING VOLTAGE
OPERATING TEMPERATURE
VIBRATION GRADE
REAR
MICA-DIELECTRIC
CN
MIL IDENTIFIER (SILVER DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC
PAPER-DIELECTRIC
CY
MIL IDENTIFIER (BLACK DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
INDICATOR METHOD A
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC
INDICATOR METHOD B
GLASS-DIELECTRIC, GLASS CASE
CB
MIL IDENTIFIER (BLACK DOT)
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
CHARACTERISTIC
MICA, BUTTON TYPE

GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK


TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMIT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
MIL IDENTIFIER (YELLOW DOT)
AXIAL LEAD
TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMIT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
FRONT
MIL IDENTIFIER (YELLOW DOT)
REAR
RADIAL LEAD
TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMIT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
MIL IDENTIFIER (YELLOW DOT)
FEED-THROUGH
STAND-OFF
TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMIT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
FRONT
MIL IDENTIFIER (YELLOW DOT)
REAR
DISK-TYPE

GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC


TEMPERATURE COEFFICIENT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
MIL IDENTIFIER (BLACK DOT)
AXIAL LEAD
TEMPERATURE COEFFICIENT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
FRONT
MIL IDENTIFIER (BLACK DOT)
REAR
RADIAL LEAD
MIL IDENTIFIER (BLACK DOT)
REAR
TEMPERATURE COEFFICIENT
1ST SIGNIFICANT FIGURE
2D SIGNIFICANT FIGURE
MULTIPLIER
CAPACITANCE TOLERANCE
FRONT
DISK-TYPE

COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

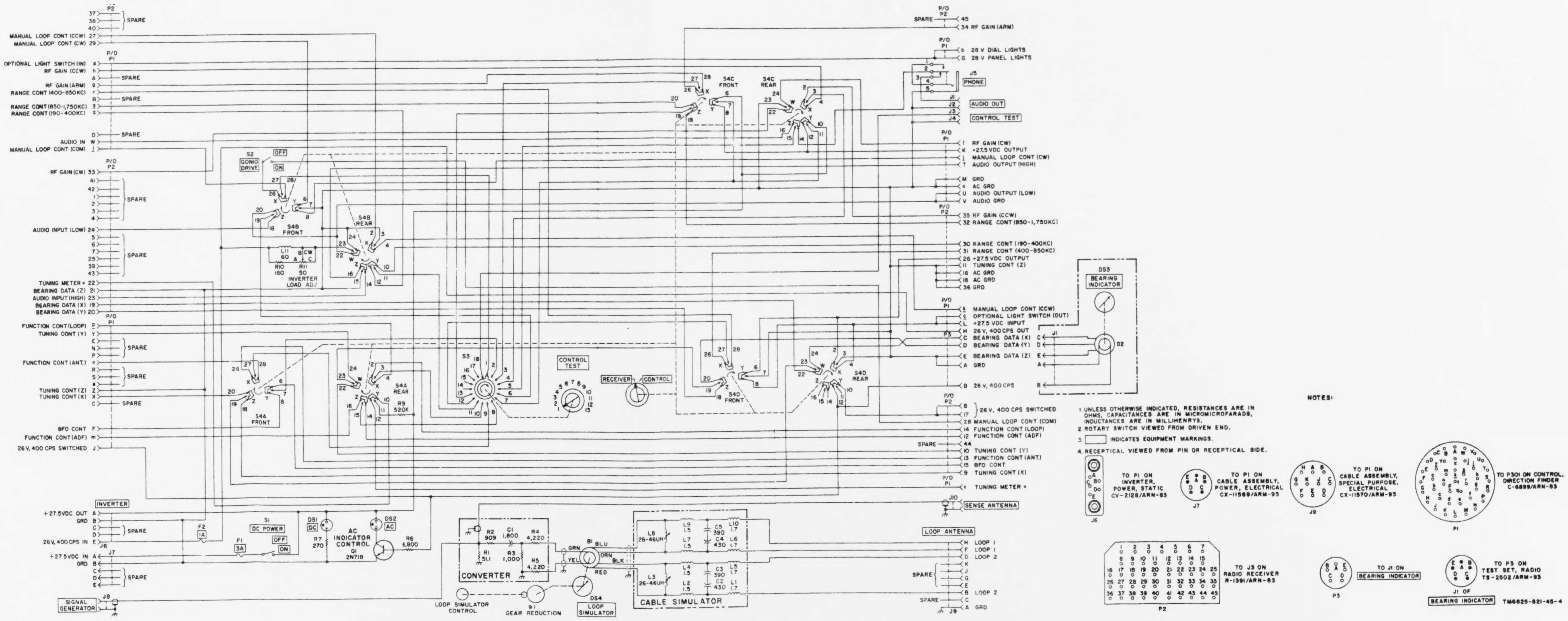
TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

STD–C8

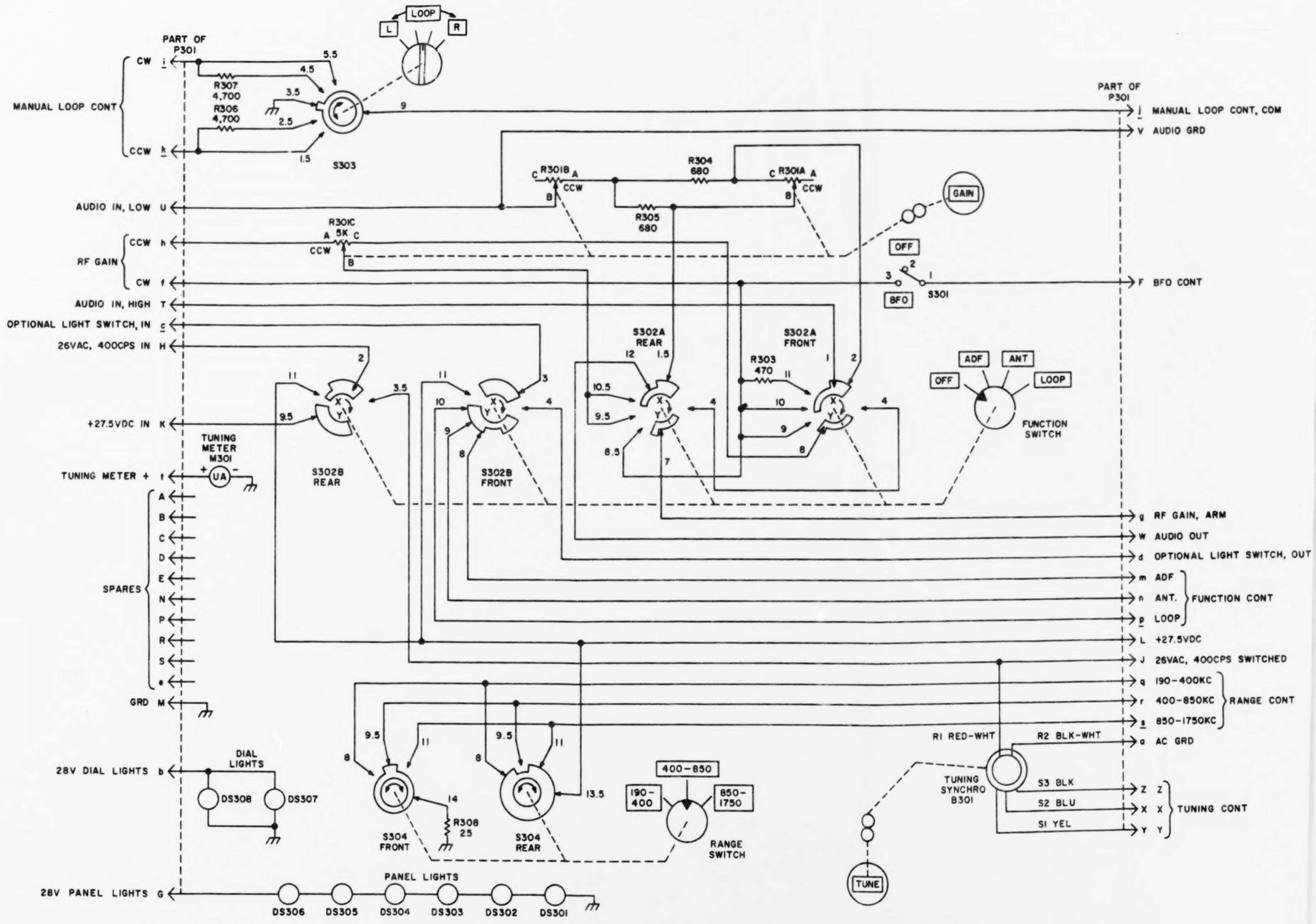
Figure 5–1. Color–code marking for MIL–STD capacitors.


P/O P2
37
38
40
SPARE
MANUAL LOOP CONT (CCW) 27
MANUAL LOOP CONT (CW) 29
P/O P1
OPTIONAL LIGHT SWITCH (IN) d
RF GAIN (CCW) h
RF GAIN (ARM) g
RANGE CONT (400-850KC) r
RANGE CONT (850-1,750KC) s
RANGE CONT (190-400KC) q
AUDIO IN W
MANUAL LOOP CONT (COM) j
RF GAIN (CW) 33
AUDIO INPUT (LOW) 24
TUNING METER + 22
BEARING DATA (Z) 21
AUDIO INPUT (HIGH) 23
BEARING DATA (X) 19
BEARING DATA (Y) 20
FUNCTION CONT (LOOP) p
TUNING CONT (Y) Y
FUNCTION CONT (ANT.) n
TUNING CONT (Z) Z
TUNING CONT (X) X
BFO CONT F
FUNCTION CONT (ADF) m
26 V, 400 CPS SWITCHED J
INVERTER
+27.5VDC OUT A
GRD B
26V, 400 CPS IN E
J6
J7
+27.5VDC IN A
GRD B
SIGNAL GENERATOR
J8
S2
GONIO DRIVE
OFF
ON
S4B FRONT
S4B REAR
L11 60
R10 160
R11 50
CW
INVERTER LOAD ADJ
S4A FRONT
S4A REAR
R9 520K
S3
CONTROL TEST
RECEIVER
CONTROL
S4C FRONT
S4C REAR
S4D FRONT
S4D REAR
F2 1A
F1 3A
S1
DC POWER
OFF
ON
DS1 DC
DS2 AC
R7 270
AC INDICATOR CONTROL
Q1 2N718
R6 6,800
R2 909
C1 1,800
R4 4,220
R1 51.1
R3 1,000
R5 4,220
CONVERTER
B1
GRN
YEL
BLU
ORN
BLK
RED
LOOP SIMULATOR CONTROL
9:1 GEAR REDUCTION
DS4
LOOP SIMULATOR
L8 26-46UH
L9 1.5
L7 1.5
C5 390
C4 430
L10 1.7
L6 1.7
L3 26-46UH
L4 1.5
L2 1.5
C3 390
C2 430
L5 1.7
L1 1.7
CABLE SIMULATOR
P/O P2
SPARE 45
34 RF GAIN (ARM)
P/O P1
b 28 V DIAL LIGHTS
G 28 V PANEL LIGHTS
J5
PHONE
J1
J2
J3
J4
AUDIO OUT
CONTROL TEST
f RF GAIN (CW)
K +27.5 VDC OUTPUT
i MANUAL LOOP CONT (CW)
T AUDIO OUTPUT (HIGH)
M GRD
a AC GRD
U AUDIO OUTPUT (LOW)
V AUDIO GRD
35 RF GAIN (CCW)
32 RANGE CONT (850-1,750KC)
30 RANGE CONT (190-400KC)
31 RANGE CONT (400-850KC)
26 +27.5 VDC OUTPUT
11 TUNING CONT (Z)
16 AC GRD
18 AC GRD
36 GRD
k MANUAL LOOP CONT (CCW)
c OPTIONAL LIGHT SWITCH (OUT)
L +27.5 VDC INPUT
H 26 V, 400 CPS OUT
P3
C BEARING DATA (X)
D BEARING DATA (Y)
E BEARING DATA (Z)
A GRD
B 26 V, 400 CPS
DS3
BEARING INDICATOR
J1
B2
8
17
26 V, 400 CPS SWITCHED
28 MANUAL LOOP CONT (COM)
14 FUNCTION CONT (LOOP)
12 FUNCTION CONT (ADF)
SPARE 44
10 TUNING CONT (Y)
13 FUNCTION CONT (ANT.)
15 BFO CONT
9 TUNING CONT (X)
t TUNING METER +
J10
SENSE ANTENNA
LOOP ANTENNA
H LOOP 1
F LOOP 1
D LOOP 2
B LOOP 2
A GRD
J9
TO P1 ON INVERTER, POWER, STATIC CV-2128/ARN-83
J6
TO P1 ON CABLE ASSEMBLY, POWER, ELECTRICAL CX-11569/ARM-93
J7
TO P1 ON CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-11570/ARM-93
J9
TO P301 ON CONTROL, DIRECTION FINDER C-6899/ARN-83
P1
TO J3 ON RADIO RECEIVER R-1391/ARN-83
P2
TO J1 ON BEARING INDICATOR
P3
TO P3 ON TEST SET, RADIO TS-2502/ARM-93
J1 OF BEARING INDICATOR
TM6625-821-45-4

NOTES:

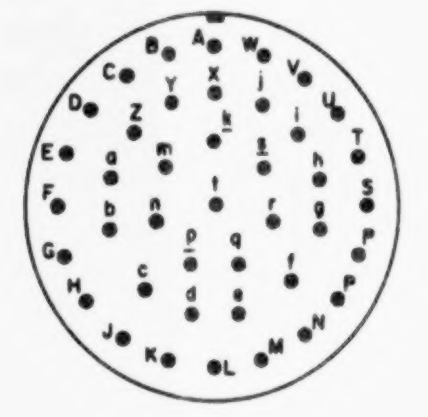
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROMICROFARADS, INDUCTANCES ARE IN MILLIHENRYS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ☐ INDICATES EQUIPMENT MARKINGS.
4. RECEPTICAL VIEWED FROM PIN OR RECEPTICAL SIDE.

Figure 5-3. Test Set, Radio TS-2502/ARM-93, schematic diagram.


PART OF P301
CW i
MANUAL LOOP CONT
CCW k
R307 4,700
R306 4,700
5.5
4.5
3.5
2.5
1.5
9
S303
LOOP
L
R
AUDIO IN, LOW U
RF GAIN
CCW h
CW f
R301C 5K
A
B
C
CCW
AUDIO IN, HIGH T
OPTIONAL LIGHT SWITCH, IN c
26VAC, 400CPS IN H
+27.5VDC IN K
TUNING METER M301
UA
TUNING METER + t
SPARES
A
B
C
D
E
N
P
R
S
e
GRD M
28V DIAL LIGHTS b
DIAL LIGHTS
DS308
DS307
28V PANEL LIGHTS G
PANEL LIGHTS
DS306
DS305
DS304
DS303
DS302
DS301
S302B REAR
S302B FRONT
S302A REAR
S302A FRONT
X
Y
R301B
R301A
R304 680
R305 680
R303 470
GAIN
OFF
BFO
S301
ADF
ANT
LOOP
FUNCTION SWITCH
S304 FRONT
S304 REAR
R308 25
14
13.5
400-850
190-400
850-1750
RANGE SWITCH
R1 RED-WHT
R2 BLK-WHT
TUNING SYNCHRO B301
S3 BLK
S2 BLU
S1 YEL
TUNE
PART OF P301
j MANUAL LOOP CONT, COM
V AUDIO GRD
F BFO CONT
g RF GAIN, ARM
W AUDIO OUT
d OPTIONAL LIGHT SWITCH, OUT
m ADF
n ANT.
p LOOP
FUNCTION CONT
L +27.5VDC
J 26VAC, 400CPS SWITCHED
q 190-400KC
r 400-850KC
s 850-1750KC
RANGE CONT
a AC GRD
Z Z
X X
Y Y
TUNING CONT

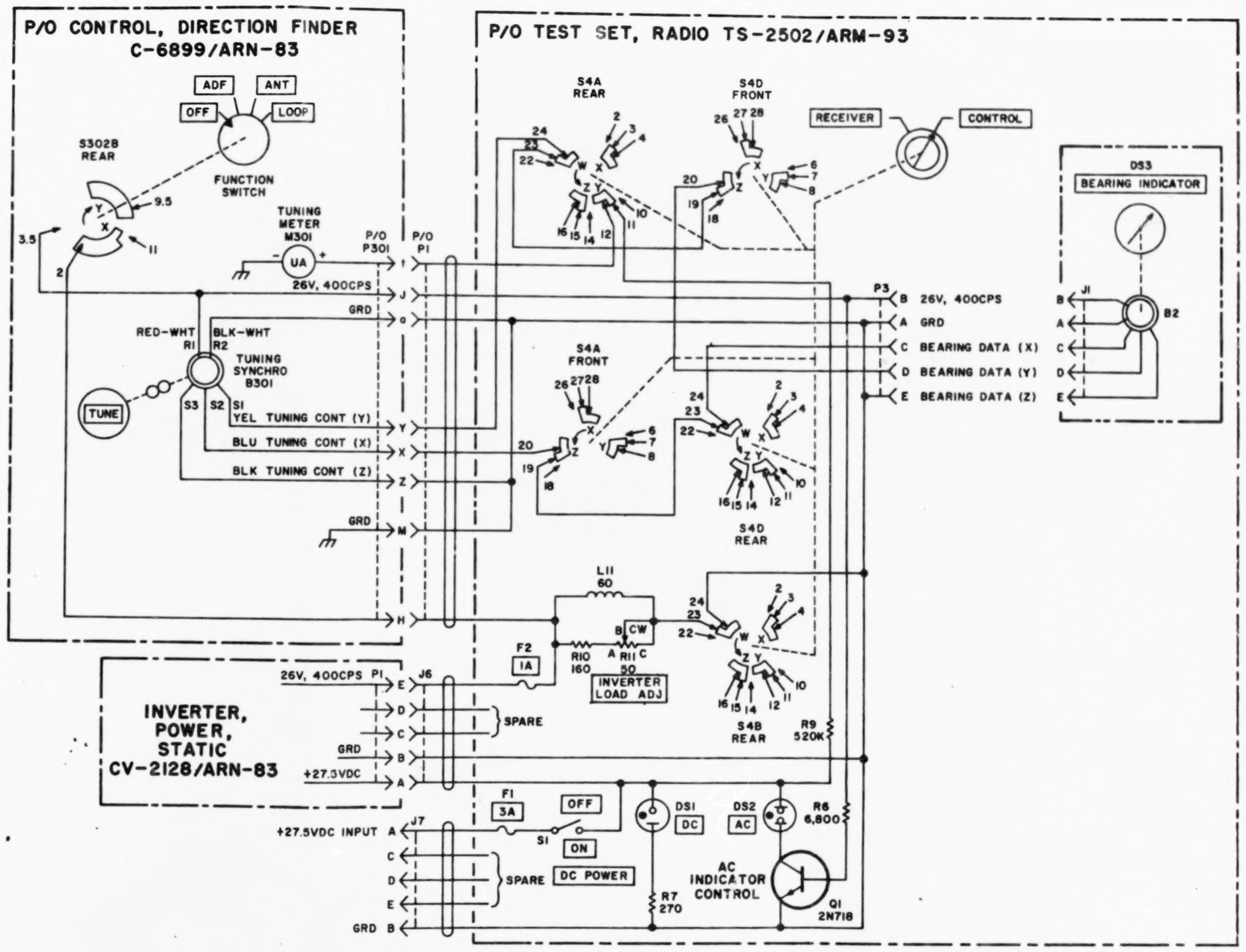
NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCE VALUES ARE IN OHMS.
2. ▭ INDICATE EQUIPMENT MARKINGS.
3. UNLESS OTHERWISE INDICATED, SWITCHES ARE VIEWED FROM KNOB OR DRIVEN END.



TM6625-821-45-17

Figure 5-5. Control, Direction Finder C-6899/ARN-83, schematic diagram.

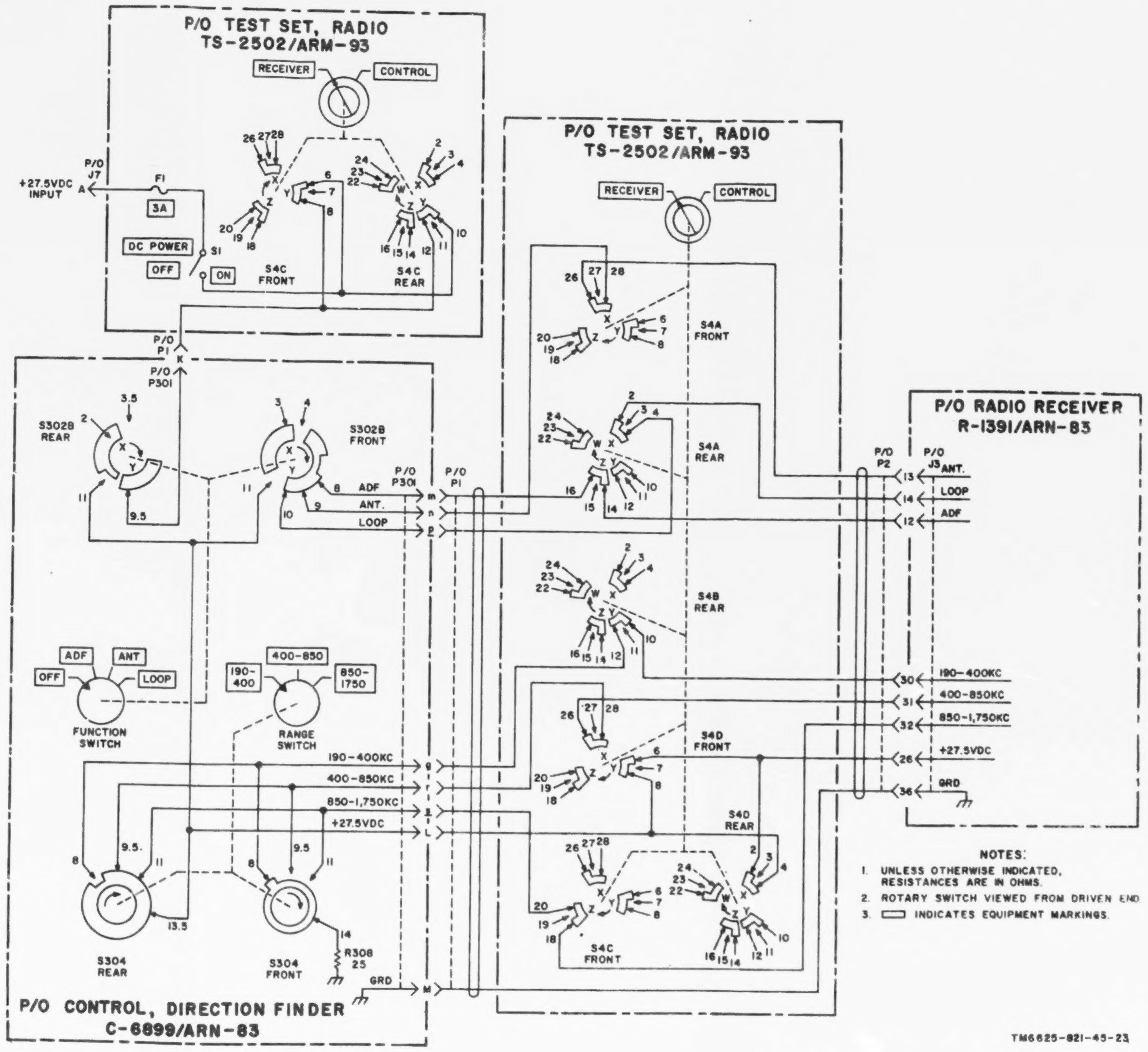

P/O CONTROL, DIRECTION FINDER C-6899/ARN-83
ADF
ANT
OFF
LOOP
FUNCTION SWITCH
S302B REAR
9.5
3.5
11
2
Y
X
TUNING METER M301
UA
26V, 400CPS
GRD
P/O P301
P/O P1
RED-WHT R1
BLK-WHT R2
TUNING SYNCHRO B301
TUNE
S3
S2
S1
YEL TUNING CONT (Y)
BLU TUNING CONT (X)
BLK TUNING CONT (Z)
GRD
J
Y
X
Z
M
H
P/O TEST SET, RADIO TS-2502/ARM-93
S4A REAR
S4D FRONT
RECEIVER
CONTROL
DS3
BEARING INDICATOR
S4A FRONT
S4D REAR
P3
B 26V, 400CPS
A GRD
C BEARING DATA (X)
D BEARING DATA (Y)
E BEARING DATA (Z)
J1
B2
L11 60
R10 160
R11 50
CW
INVERTER LOAD ADJ
F2 1A
S4B REAR
R9 520K
INVERTER, POWER, STATIC CV-2128/ARN-83
26V, 400CPS P1
J6
SPARE
GRD
+27.5VDC
F1 3A
OFF
ON
S1
DC POWER
DS1 DC
DS2 AC
R6 6,800
R7 270
AC INDICATOR CONTROL
Q1 2N718
+27.5VDC INPUT A
J7
SPARE
GRD B

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, INDUCTANCES ARE IN MILLIHENRYS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-21

Figure 5–6. Circuits for checking tuning meter and tuning control information, schematic diagram.


P/O TEST SET, RADIO
TS-2502/ARM-93
RECEIVER
CONTROL
P/O J7
+27.5VDC INPUT
A
F1
3A
DC POWER
S1
OFF
ON
S4C FRONT
S4C REAR
P/O P1
K
P/O P301
S302B REAR
S302B FRONT
ADF
ANT.
LOOP
P/O P301
P/O P1
ADF
ANT
OFF
LOOP
FUNCTION SWITCH
190-400
400-850
850-1750
RANGE SWITCH
190-400KC
400-850KC
850-1,750KC
+27.5VDC
S304 REAR
S304 FRONT
R308 25
GRD
P/O CONTROL, DIRECTION FINDER
C-6899/ARN-83
P/O TEST SET, RADIO
TS-2502/ARM-93
RECEIVER
CONTROL
S4A FRONT
S4A REAR
S4B REAR
S4D FRONT
S4D REAR
S4C FRONT
P/O P2
P/O RADIO RECEIVER
R-1391/ARN-83
P/O J3
ANT.
LOOP
ADF
190-400KC
400-850KC
850-1,750KC
+27.5VDC
GRD

NOTES:

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. ROTARY SWITCH VIEWED FROM DRIVEN END.
3. ▭ INDICATES EQUIPMENT MARKINGS.

TM6625-821-45-23